Cabeza Prieta
National Wildlife Refuge

Comprehensive Conservation Plan
Wilderness Stewardship Plan and
Environmental Impact Statement

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Comprehensive Conservation Plans provide long-term guidance for management decisions; set forth goals, objectives, and strategies needed to accomplish refuge purposes; and identify the Fish and Wildlife Service's best estimate of future needs. These plans detail planning program levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

READER'S GUIDE

The U.S. Fish and Wildlife Service (FWS or Service) will manage the Cabeza Prieta National Wildlife Refuge (NWR) in accordance with an approved Comprehensive Conservation Plan (CCP). The CCP provides long-range guidance on Refuge management through its vision, goals, objective and strategies. The CCP also provides a basis for a long-term adaptive management process including implementation, monitoring progress, evaluating and adjusting, and revising plans accordingly. Additional step-down planning will be required prior to implementation of certain programs and projects.

This document combines a Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement (CCP/WSP/EIS). This revised Final CCP/WSP/EIS incorporates changes based on public and agency comments received during public review of the Draft CCP/WSP/EIS, released in March 2005. Following publication of the Final CCP/WSP/EIS, the Service will publish a Record of Decision (ROD) confirming that the preferred management alternative identified in the plan is suitable for implementation. At this point, Cabeza Prieta NWR will initiate implementation of the management plan detailed in Appendix M of the CCP/WSP/EIS. The following chapter and appendix descriptions are provided to assist readers in locating and understanding the various components of this combined document.

Chapter 1*, Introduction, Purpose and Need for Action,* includes general information about the National Wildlife Refuge System and Cabeza Prieta NWR, such as planning policy, regional context, history of refuge establishment, past management trends, designation of Federal Wilderness, and Cabeza Prieta NWR Vision Statement. This chapter also describes planning issues identified through public and agency scoping.

Chapter 2*, Management Alternatives,* describes each of the five management alternatives analyzed in the EIS. Alternative 1 is the "No Action" alternative, or current management practices at the refuge. Alternative 2 is a minimum intervention alternative, featuring very limited active management. Alternative 3 is the restrained intervention alternative, and focuses on a modest amount of active management. Alternative 4, the preferred alternative, features more active intervention than Alternatives 2 and 3. Alternative 5, maximum effort, features intensive management aimed at maximizing numbers of desert bighorn sheep and maximizing public use of the refuge.

Chapter 3*, The Affected Environment,* provides a baseline description of refuge resources. Resources include the physical environment, water resources, habitat and wildlife resources, refuge facilities, special management areas, cultural resources and the regional economy. This information provides the baseline against which each alternative's impacts are measured in Chapter 4.

Chapter 4*, Environmental Consequences,* provides an analysis of the impacts to each resource described in Chapter 3 that would result from implementing each alternative. Chapter 4 also describes cumulative impact and environmental justice considerations. This is probably the most important section of the EIS,

Appendix A: *Legal, Policy and Administrative Guidelines and Other Special Considerations,* provides additional background regarding the Federal laws, regulations and policies that govern administration of the National Wildlife Refuge System.

Appendix B: *Interagency Agreements* contains a current copy of the *Memorandum of Understanding among the United States Department of Homeland Security and United States Department of the Interior and United States Department of Agriculture Regarding Cooperative National Security and Counterterrorism Efforts on Federal Lands along the United States' Borders*, as signed in March 2006.

Appendix C: ***Comments Received on Draft CCP/WSP/EIS,*** contains verbatim transcripts of public hearing testimony and copies of written public comments received during the public and agency review period of the Draft CCP/WSP/EIS.

Appendix D, ***Response to Public Comments,*** contains summaries of substantive public and agency comments received, grouped by topic, along with the Service response to the comments.

Appendix E, ***Plant Species Present at Cabeza Prieta National Wildlife Refuge,*** is a list of all the plant species known to occur on the refuge. Invasive and exotic species are indicated in the text.

Appendix F, ***Minimum Requirements Analyses for Refuge Management Actions in Cabeza Prieta National Wildlife Refuge Designated Wilderness,*** generic MRAs for each class of management action proposed in Alternative 4 are included in this appendix. These analyses demonstrate the general compliance of the activity class with wilderness. Site and project-specific Minimum Requirements Analyses will still be completed for individual management actions.

Appendix G, ***Compatibility Determinations for Public Uses at Cabeza Prieta National Wildlife Refuge,*** contains completed determinations of the compatibility of each public use proposed in Alternative 4 with the refuge purposes.

Appendix H, ***Bird Species Present at Cabeza Prieta National Wildlife Refuge,*** is a list of all the bird species known to occur on the refuge. The frequency and season of occurrence of each species is also indicated.

Appendix I, ***Mammal Species Present at Cabeza Prieta National Wildlife Refuge,*** is a list of all the mammal species known to occur on the refuge.

Appendix J, ***Amphibian and Reptile Species Present at Cabeza Prieta National Wildlife Refuge,*** includes lists of all the amphibian and reptile species known to occur on the refuge.

Appendix K, ***Social Impact Analysis Report,*** is the full text of a report completed by the U.S. Geological Service analyzing the social impacts of the various refuge management alternatives. This report informs the social impact discussions of found in Chapter 4.

Appendix L, ***Regional Economic Effects of Current and Proposed Management,*** is the full text of a report completed by the U.S. Geological Service analyzing the economic impacts of the various refuge management alternatives. This report informs the economic impact discussions of found in Chapter 4.

Appendix M, ***Comprehensive Conservation Plan Management Goals, Objectives and Strategies,*** this appendix is the functional CCP. It presents the management regime of Alternative 4, the preferred alternative, in detail.

Appendix N, ***Intra-Service Biological Opinion for the Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan, Arizona,*** is a review of the potential effects of implementing the CCP upon threatened and endangered species, as required under Section 7 of the Endangered Species Act.

Appendix O, ***References Cited,*** is the bibliography of the CCP/WSP/EIS.

Appendix P, ***List of Preparers***, includes all the individuals or groups who assisted in preparation of the CCP/WSP/EIS.

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LIST OF ACRONYMS AND ABBREVIATIONS USED

ABC	Arizona Border Control Initiative
ADA	Americans with Disabilities Act
AFS	Air Force Station
AGFD	Arizona Game and Fish Department
AGL	above ground level
AIDTT	Arizona Interagency Desert Tortoise Team
ARPA	Archeological Resource Protection Act of 1979
BANN	Border Anti-Narcotics Network
BEC	Barry M. Goldwater Executive Committee
BLM	United States Bureau of Land Management
BMGR	Barry M. Goldwater Range
BMP	Best Management Practices
CBP	United States Customs and Border Protection
CBP-BP	United States Customs and Border Protection, Border Patrol
CCP	Comprehensive Conservation Plan
CEQ	Council for Environmental Quality
dB	decibel
DEA	United States Drug Enforcement Agency
DEIS	Draft Environmental Impact Statement
DoD	United States Department of Defense
EA	Environmental Assessment
EHD	Epizootic Hemorrhagic Disease
EIS	Environmental Impact Statement
EOD	Explosive Ordnance Disposal
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
FWS	United States Fish and Wildlife Service
GIS	Geographic Information System
GSV	Gila, Salt, Verde Rivers Ecosystem Region
IEC	Inter-agency Executive Committee
LNT	leave-no-trace wilderness camping and travel
LSL	Length of Stay Limit
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MRA	Minimum Requirements Analysis
MSL	mean sea level
NEPA	National Environmental Policy Act of 1969
NCTC	National Conservation Training Center
NGO	non-governmental organization
NOI	Notice of Intent
NPS	National Park Service
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
OMB	Office of Management and Budget
OPCNM	Organ Pipe Cactus National Monument
PVA	Population Viability Analysis
Service	United States Fish and Wildlife Service
SUP	Special Use Permit
UDA	Undocumented Alien
USAF	United States Air Force

USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USMC	United States Marine Corps
WSP	Wilderness Stewardship Plan
WTI	Weapons & Tactics Instructor

1.0 INTRODUCTION, PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

This document integrates a Comprehensive Conservation Plan (CCP), Wilderness Stewardship Plan (WSP) and Environmental Impact Statement (EIS) for Cabeza Prieta National Wildlife Refuge (NWR). See figure 1.1 for a map showing the location of the refuge in southwestern Arizona. The U.S. Fish and Wildlife Service (Service) is required to prepare Comprehensive Conservation Plans by the National Wildlife Refuge System Improvement Act (P.L. 105-57) passed in 1997. An Environmental Assessment (EA) or EIS is required for any major federal action by the National Environmental Policy Act of 1969 (NEPA). The CCP describes the desired future condition of the refuge and provides long-range guidance and management direction for the refuge. The EIS describes a range of alternatives, including the preferred alternative, for managing the refuge and the expected environmental consequences of each alternative.

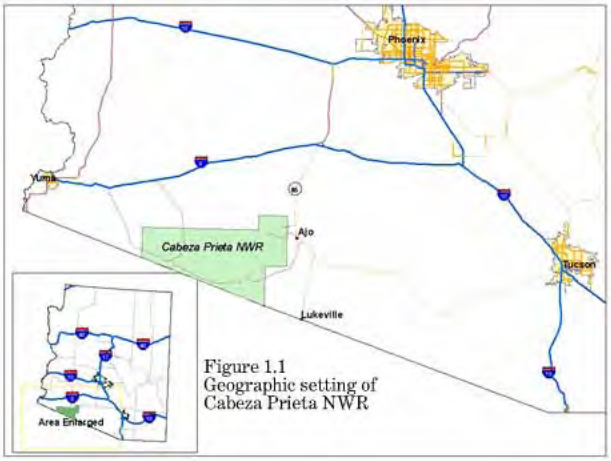


Figure 1.1
Geographic setting of
Cabeza Prieta NWR

1.1.1 Goals of Refuge Planning

The goals of refuge comprehensive conservation planning as defined by policy at 602 FW1 (1.5) follow:

A. To ensure that wildlife comes first in the National Wildlife Refuge System.

B. To ensure that the Service manages the Refuge System for the conservation of fish, wildlife, plants, and their habitats and that refuge management achieves Service policies, the Refuge System mission, and the purposes for which the refuge was established.

C. To ensure that the administration of the Refuge System contributes to the conservation of the ecological integrity of each refuge, the Refuge System, and to the structure and function of the ecosystems of the United States.

D. To ensure opportunities to participate in the refuge planning process are available to other Service programs; Federal, State, and local agencies; tribal governments; conservation organizations; adjacent landowners; and the public.

E. To provide a basis for adaptive management by monitoring progress, evaluating plan implementation, and updating refuge plans accordingly.

F. To promote efficiency, effectiveness, continuity, and national consistency in refuge management.

G. To help ensure consistent System wide consideration of the six priority public uses -- hunting, fishing, wildlife observation and photography, and environmental education and interpretation-- established by the Refuge Administration Act and to ensure that these uses receive enhanced consideration over general public uses in the Refuge System.

H. To ensure that the Service preserves the wilderness character of refuge lands (2000).

1.2 PURPOSE AND NEED FOR PLAN ACTIONS

The refuge plays a critical role in the recovery and protection of rare and sensitive species such as the desert bighorn sheep and the federally endangered Sonoran pronghorn, as well as the conservation of a diversity of desert wildlife within the Sonoran Desert. Cabeza Prieta NWR, which contains the largest refuge wilderness outside of Alaska, presents issues related to appropriate levels of intervention for wildlife management in designated wilderness that have national significance for the Service. A CCP establishes refuge Goals, Objectives and Management Strategies. These planned actions are all designed to assist the refuge in achieving its formal purposes and the Mission of the National Wildlife Refuge System. This document proposes the implementation of a wide array of actions that lead to achievement of such purposes and mission.

Cabeza Prieta NWR was:

> . . . reserved and set apart for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources... Provided, however, that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve should be available for livestock... (Executive Order 8038 January 25, 1939)

Title III of the Arizona Desert Wilderness Act of 1990[1] supplemented the refuge purposes with an additional refuge purpose; the protection of the wilderness resource on 325,270 hectares (803,418 acres) in accordance with the Wilderness Act of 1964.

A CCP also sets guidelines for management of refuge resources, describes the desired outcomes for the next 15 years, and encourages refuge management in concert with an overall ecosystem approach. The CCP development process provides a forum for public participation relative to the type, extent, and compatibility of uses on refuges. As a majority of the refuge is designated wilderness, this plan addresses administrative needs for wilderness and serves as the refuge's Wilderness Stewardship Plan.

[1]This purpose has been added as "supplemental to", or in addition to, the original purposes when the Arizona Desert Wilderness Act of 1990 was passed and signed into law.

1.3 NATIONAL WILDLIFE REFUGE SYSTEM MISSION, GOALS AND GUIDING PRINCIPLES

The National Wildlife Refuge System is the only Federally-administered system of lands managed primarily for the conservation of fish, wildlife, and plant resources. The Refuge System mission is a derivative of the Service mission. The Refuge System mission was clarified and formalized in October 1997, by passage of the National Wildlife Refuge System Improvement Act (P.L. 105-57).

The Act amends the National Wildlife Refuge System Administration Act of 1966 in a manner that provides an "Organic Act" in that it designates the fundamental guiding principles of the National Wildlife Refuge System. It ensures that the Refuge System is effectively managed as a national system of lands, waters, and interests for the protection and conservation of our nation's wildlife resources. The Act states first and foremost that the mission of the Refuge System be focused on wildlife conservation, defining the Mission of the Refuge System as follows:

> *"To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."*

The Act gives guidance to the Secretary of the Interior in the overall management of the Refuge System. Besides a strong conservation mandate for the Refuge System, the Act's other main components include:

a requirement that the Secretary of the Interior maintain the biological integrity, diversity and environmental health (ecological integrity) of the Refuge System,

the establishment of six priority recreational uses that should be considered for integration into refuge programs if determined compatible with refuge purposes and Refuge System mission,

a new process for determining compatible uses of refuges that integrates public review, and

a requirement for preparing comprehensive conservation plans.

The Goals of the Refuge System are defined in the Fish and Wildlife Service Manual (601 FW).

To preserve, restore, and enhance in their natural ecosystems (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered.

To perpetuate the migratory bird resource.

To preserve a natural diversity and abundance of fauna and flora on refuge lands.

To provide an understanding and appreciation of fish and wildlife ecology and the human role in the environment, and to provide refuge visitors with high quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established.

1.4 ECOSYSTEM APPROACH TO CONSERVATION AND THE GILA/SALT/VERDE ECOSYSTEM

The Service has adopted an ecosystem approach to fish and wildlife conservation to recognize the interdependence of all elements of the system, increase cooperation among Service programs, and increase partnerships to achieve conservation goals.

The Service identified and mapped 53 ecosystem units throughout the United States by grouping watersheds. Ecosystem Teams were established and directed to develop plans for each unit that describe ecological resources, issues relevant to the resources, and conservation strategies. The Gila/Salt/Verde Ecosystem (GSV) is one of the nine ecosystem units within the Southwest Region. It is named for three major watersheds located in southern Arizona and western New Mexico. Cabeza Prieta NWR is located within the GSV Ecosystem. See figure 1.2 for a map depicting the extent of the GSV and the refuge's location therein. Other units of the National Wildlife Refuge System within the GSV include: Kofa, San Bernardino, Leslie Canyon and Buenos Aires.

Figure 1.2 Gila/Salt /Verde Ecosystem and the Refuge

The diversity of the GSV Ecosystem required developing objectives and strategies for three different systems (Mountain, Grassland, and Desert). Objectives for the desert ecosystem are described under Objective 3. Cabeza Prieta NWR is charged with accomplishing certain action items under the second strategy of that objective through partnerships with other agencies, organizations, and individuals in the area. To the greatest degree feasible, these action items are incorporated into the refuge management alternatives described below in Chapter 2. Strategy 2 of Objective 3 of the GSV Ecosystem plan follows.

Objective 3: Protect, maintain, and restore Sonoran Desert ecosystems

Strategy 2: Protect, maintain, and restore ecosystem function for terrestrial habitats including Federally listed, candidate, and state listed species.

Action Item 1: Gather information on habitat use (and role of free water) and disturbances to Sonoran pronghorn through telemetry, behavioral, and habitat studies.

Action Item 2: Complete range wide Sonoran pronghorn surveys over six-year period to establish a trend for recovery purposes.

Action Item 3: Upgrade Geographic Information System (GIS) hardware and complete GIS data bank for pronghorn range.

Action Item 4: Initiate and design a comprehensive strategic regional plan for the area represented by the International Sonoran Desert Alliance (ISDA) which pulls together individual management plans.

Action Item 5: Clean up the abandoned military station on Childs Mountain.

Action Item 6: Consolidate communications sites on Childs Mountain to reduce the disturbed area.

Action Item 7: Determine presence and genetics of obligate rock dwelling reptiles to investigate effects of isolated desert mountain ranges.

Action Item 8: Initiate pilot study to determine genetics of isolated bands of bighorn sheep to determine degree of isolation for disease and transplant implications.

Action Item 9: Establish an interagency interpretive site in Ajo to cover area of ISDA concern.

Action Item 10: Locate and establish wildlife corridors that will link the protected areas of Organ Pipe Cactus National Monument (OPCNM) and Cabeza Prieta NWR with the core area of the Pinacate Biosphere Reserve. Reduce and mitigate wildlife barriers. Identify major invading exotic plant species.

Action Item 11: Support desert pupfish maintenance and habitat restoration on National Park Service lands and investigate feasibility of secondary populations on adjacent refuge lands (USFWS 1994).

1.5 HISTORY OF REFUGE ESTABLISHMENT, ACQUISITION AND MANAGEMENT

1.5.1 The Game Range

The Cabeza Prieta NWR was originally established as a "Game Range" by Executive Order 8038 signed by President Franklin D. Roosevelt on January 25, 1939. This Range was established primarily to assist in the recovery of the desert bighorn sheep, and partially in response to public demand generated by the Boy Scouts of America, Arizona Game Protective Association, and the Audubon Society. Throughout the earlier part of the 20th Century desert bighorn sheep populations continued to dwindle, despite legal protection. In the early and mid 1930s, staff of the U.S. Biological Survey; National Park Service (NPS); State of Arizona; and Mexican Government Department Forests, Fish and Game conducted surveys of Southwestern Arizona. These surveys recommended establishment of a game range or preserve to protect the natural resources of the Cabeza Prieta area (and other areas in southwestern Arizona) for protection of the desert bighorn sheep (Taylor 1935, McDougall 1935, and Pinkley 1935). See figure 1.3 for a map of the refuge.

Given the trend of decreasing desert bighorn sheep populations and public interest in conserving the species, active management to foster increased sheep numbers was seen as necessary. A strategy involving water structure development and active management of the rocky, arid sierras and intermittent drainage areas was implemented for species recovery throughout their historic range in Arizona. Kennedy, researching the status of desert bighorn sheep on the Kofa and Cabeza Prieta National Game Ranges, determined that developed waters and natural water sources contributed to desert bighorn sheep population growth on the Cabeza Prieta National Game Range during the 1950s (1958).

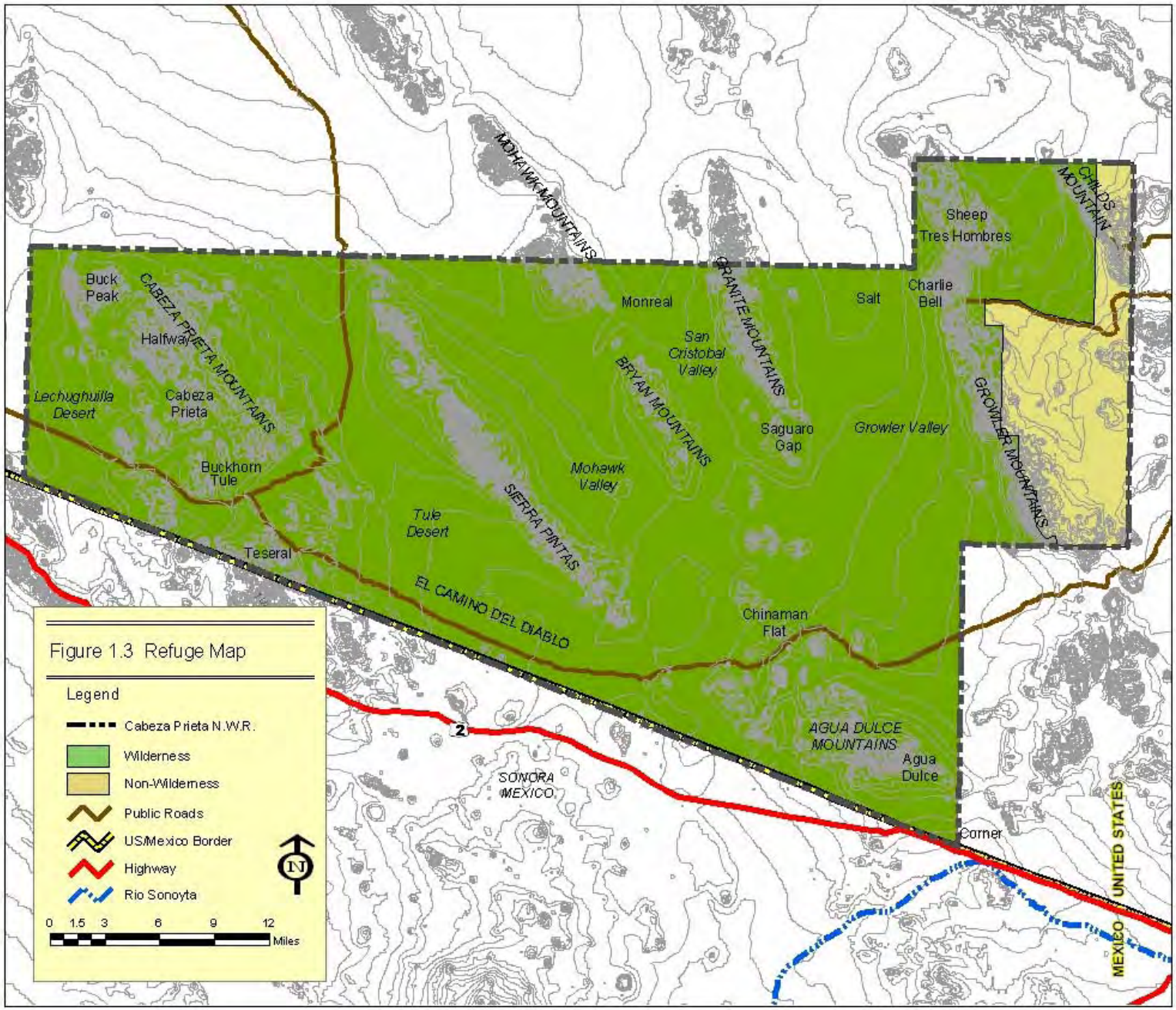
Between its establishment in 1939 and 1975, the Game Range was jointly administered by the Bureau of Sport Fisheries and Wildlife (now the U.S. Fish and Wildlife Service) and the Bureau of Land Management (BLM).

1.5.2 Military Lands Withdrawal

Air Force F-16 fliying over the refuge

USAF Photo

A series of four executive orders signed by President Franklin Roosevelt and two public land orders signed by the Secretary of Agriculture between September 5, 1941 and March 16, 1943 withdrew a block of land totaling 1,124,546 hectares (2,777,628 acres) for military flight training needs occasioned by World War II. Most of the airspace above Cabeza Prieta Game Range was included and active bombing started. During this time grazing, mining, and most refuge activities were curtailed for safety reasons. Most management studies had to be done by air or in the extreme eastern portion, which was not withdrawn. The bombing and aerial gunnery range was deactivated in 1946, but was reactivated in 1951 to serve training needs occasioned by the Korean Conflict. The military range has been maintained in use for military training since that time through a series of administrative and legislative actions.


MOHAWK MOUNTAINS
CHILDS MOUNTAIN
Sheep
Tres Hombres
Buck
Peak
CABEZA PRIETA MOUNTAINS
Halfway
Monreal
GRANITE MOUNTAINS
Salt
Charlie
Bell
San
Cristobal
Valley
BRYAN MOUNTAINS
Lechuguilla
Desert
Cabeza
Prieta
Saguaro
Gap
Growler Valley
GROWLER MOUNTAINS
Buckhorn
Tule
Mohawk
Valley
SIERRA PINTAS
Tule
Desert
Teseral
EL CAMINO DEL DIABLO
Chinaman
Flat
2
AGUA DULCE
MOUNTAINS
Agua
Dulce
SONORA
MEXICO
Corner
UNITED STATES
MEXICO
Figure 1.3 Refuge Map
Legend
Cabeza Prieta N.W.R.
Wilderness
Non-Wilderness
Public Roads
US/Mexico Border
Highway
Rio Sonoyta
N
0 1.5 3 6 9 12
Miles

The Military Lands Withdrawal Act of 1999 (P.L. 106-65), the most recent action renewing the military lands withdrawal, did not include lands of Cabeza Prieta NWR within the BMGR. Airspace over the refuge, however, remains included within the BMGR, as does ground instrumentation used to monitor military aircraft. The Military Lands Withdrawal Act of 1999 also provides that upgrades to ground instrumentation on the refuge are allowed, so long as they "create similar or less impact than the existing ground instrumentation permitted by the Arizona Desert Wilderness Act of 1990." A memorandum of Understanding (MOU) between the Department of the Air Force, the Department of the Navy (for the Marine Corps) and the Department of the Interior (for the Service) stipulates mutually agreed upon limitations of use. The MOU was signed in 1994, and was specifically authorized in the Act to facilitate governance of military use of the ground and airspace over the refuge wilderness.

1.5.3 National Wildlife Refuge Administration Act

The passage of the National Wildlife Refuge System Administration Act of 1966 opened many refuges to public recreation. Shortly after that, Cabeza Prieta NWR was opened to desert bighorn sheep hunting. Harvest levels are reestablished every three years based on aerial population surveys. Permit numbers have fluctuated from one in 1980 to seven in recent years.

1.5.4 From Game Range to National Wildlife Refuge

Public Land Order 5493 of March 21, 1975, amended the original Executive Order (8039), gave sole jurisdiction to the Service, and changed the name of the Game Range to Cabeza Prieta NWR. The refuge took over management of the grazing allotments on the refuge at this time. Although by this time refuge staff had become concerned about the effects of grazing on desert bighorn sheep habitat, the existing leases were not immediately terminated.

Subsequent to the land order, the Game Range Bill amendments to the National Wildlife Refuge Administration Act (P.L. 94-223, 90 Stat. 199 or "The Act of Feb. 27, 1976") affirmed the Secretary of the Interior's (i.e., the Service's) responsibility to protect the integrity of the former Cabeza Prieta Game Range as a part of the National Wildlife Refuge System and the integrity of the original purposes for which the refuge was established. Under this law, all grazing leases issued by the BLM under their administration of the land were honored by the Service. Upon the expiration of each such lease the Service reviewed the lease and determined whether or not to renew it. The Act also prohibits the divestiture of lands within the National Wildlife Refuge System by the Secretary of the Interior without the express permission of Congress.

1.5.5 Grazing History

There were as many as six grazing allotments operating at one time on the Range. Grazing began as early as 1919 and came under the jurisdiction of the BLM when the Range was established in 1939. The enabling legislation specified that all forage resources in excess of that required to maintain a balanced wildlife population within the range would be available to livestock.

Most grazing occurred on the eastern portion of the Range where shallow wells could be dug. During the period of federal jurisdiction a total of seven ranchers held permits to graze livestock on the land that

became the refuge. The earliest permittees were Tom Childs and Jeff Cameron. Childs ranched about 100 head of cattle. Charlie Bell took over Child's lease in the 1930s and had a permit to graze 400 goats prior to the area becoming a game range. When the Game Range was established, goats and sheep were banned but Bell continued to run cattle. Benjamin Parra also obtained a permit for 100 head of cattle in 1940. Childs, Bell, and Parra lost their permits when the military withdrew lands for active bombing, but enforcement was lax. Childs and Bell continued to run cattle at their own risk. Alton Netherlin bought Parra's cattle in 1942 and leased the area around Papago Well, running as many as 700 head. Angel Monreal had a permit to graze 80-100 head but records do not indicate dates for his lease. Jim Havins ran a small herd in the area of Papago Well in the 1940s. Havins was asked to remove all structures around Papago Well in 1965, while Cameron was allowed to renew his lease until 1981. Cameron ran 154 head of cattle in 1964, and 150 head in 1970 (with up to 1,500 cows additionally brought in for short terms). When the refuge took over grazing management in 1975 Cameron's permit was set at 129 head. Since the Cameron permit expired in 1981 there has been no legal grazing on the refuge.

As early as 1946, refuge staff began to notice the impact livestock were having on wildlife forage. They observed that desert bighorn sheep were using the lower elevations in summer, feeding on ironwood beans and saguaro pulp. These plants were probably supplying much needed moisture during the dry season. Managers recommended stopping grazing to reduce competition for limited forage resources, as the cattle also used this forage.

A study commissioned in 1965 to determine the effect of grazing and wildlife competition noted "abusive use of perennial shrubs and other plants important to wildlife" but stopped short of recommending that grazing be discontinued (Harper and Wiseman 1965). In 1977 the Sonoran pronghorn recovery team recommended that grazing leases on the refuge be terminated to end a perceived displacement of pronghorn from suitable habitat by cattle (Phelps, 1977). When the refuge took over grazing permits in 1975, they offered to continue Cameron's lease under conditions that would permit the habitat to recover. The permit would be renewed for 1-3 years out of ten for a period of 60 days at a time. Cameron rejected the offer, arguing that the conditions were not economically feasible.

Congress then asked the Service to study the effects of grazing on the refuge. The Service initiated the study in 1983 in conjunction with the BLM (Cabeza Prieta NWR 1983). Permanent vegetation transects were set up on the old Cameron allotment to document recovery when cattle were removed. The BLM also set up another study on grazed land east of the refuge boundary to study competition with Sonoran pronghorn. The study showed 50 percent of a cow's spring diet was globe mallow, and their summer and fall diet was composed mostly of mesquite. It further concluded that little competition occurred between cattle and Sonoran pronghorn because cattle graze and pronghorn browse. Refuge biologists challenged this finding, arguing that strict classifications of browser and grazer were not accurate descriptions of the actual feeding habits of cattle and pronghorn.

In 1992, the Arizona Nature Conservancy conducted a vegetation impacts study on OPCNM after grazing was discontinued there (D'Antonio and Vitousek 1992). Noted increases in vegetation cover were influenced by unusual rainfall during the study years. Interestingly, rodent abundance declined and pocket mice in particular disappeared. However, in one study area, bannertail kangaroo rats returned after being absent the previous year. Their return was attributed to an increase in vegetation cover after removal of livestock.

1.5.6 Trespass Livestock History

Since refuge establishment, trespass cattle, both from adjacent grazing leases on BLM lands to the east and from Mexico, have been a continuing problem. A boundary fence was built on the east side in 1980, reducing trespass from the BLM lands. The largest problem came from the Gray Ranch, whose grazing lease was within OPCNM, adjacent to the refuge. Although their lease was for 1,050 head, refuge staff estimated there was three times that many. The refuge took the family to court in1965 to settle this dispute. The family was given one year to remove their livestock, but it wasn't until the last Gray brother died in 1976 that all the cattle were removed.

Feral burros and wild horses from Mexico were also a major problem. Burros and horses selectively browse woody vegetation in riparian corridors, girdling paloverde and other trees that form important habitat. In 1944, over 100 horses and 125 burros were documented on the refuge in one day. The situation improved when fear of hoof and mouth disease prompted construction of 36 kilometers (22 miles) of border fence between 1948 and 1949. Rare sightings continued into the 1960s, but none in recent years, other than occasional burro tracks seen at Tule well.

Domestic goats, both as trespass livestock on the refuge and as livestock on ranches or farms near the refuge, are problematic to wild desert bighorn sheep. Goats provide a host for the larval stage of the parasitic bot fly. The bot fly larvae also parasitize desert bighorn sheep. In desert bighorn sheep the larvae cause chronic sinusitis, a debilitating, and often lethal, condition. Many sheep on the refuge suffer from chronic sinusitis, introduced by domestic goats on or near the refuge. Chronic sinusitis is a decimating factor to the refuge's desert bighorn sheep population.

1.5.7 Mining History

Many mines in northern Sonora and southern Arizona were developed during Spanish rule, but no such activity appears to have taken place on the refuge. The gold rush of 1849 led prospectors to cross the area on El Camino del Diablo, an ancient trail that passed through the southern part of the refuge. This original trail system, more a braided corridor of multiple paths than a single trail, is distinct from the modern refuge access road that shares its name and general location. A second wave occurred when gold was discovered in the Colorado Valley in the 1860s. Miners' graves are landmarks along the route.

San Antonio Mica Mine USFWS Photo

The Game Range was left open to mining when it was established. Military withdrawal in the 1940s temporarily stopped all mining activity. The exact number of claims extant at that time is unknown. The Game Range listed 17 unpatented and one patented claim in 1971 (USDI, Bureau of Sport Fisheries and Wildlife 1971). The Bureau of Mines speculated that modern survey techniques might produce mineral potential and a study was mandated in 1979. Wilderness designation in 1990 closed future mineral explorations. Today, the only current claim is the non-patented San Antonio Mica Mine that produced mica for the Phelps Dodge Company in Ajo.

Mining has left its legacy in the form of numerous shafts, tunnels, water tanks, and other debris surrounding old mine sites. The remains now present complex issues for the refuge. They negatively impact wilderness character but may deserve protection as historic artifacts. Some structures may now provide habitat for some wildlife species, such as endangered bats, but may also pose a danger to other wildlife and humans.

(drawing by Bonnie Swarbrick)

1.5.8 The Endangered Species Act (ESA) and Sonoran Pronghorn

Sonoran pronghorn were one of the first species declared endangered. They were included in the first endangered species legislation, the Endangered Species Preservation Act of October 15, 1966, which published a list that included the Sonoran pronghorn on March 8, 1967. They were also included in Appendix D of the Endangered Species Conservation Act, August 25, 1970, and again under the Endangered Species Act of 1973. This act directed the Service to prepare recovery plans for all species declared threatened or endangered. Cabeza Prieta NWR was given the lead for recovery of the Sonoran pronghorn in 1988, thus elevating its status as a refuge management priority. The original recovery plan was completed in 1982 with the last revision occurring in 1998. Recovery plans were guided by a core working group until 1998 when a formal recovery team was established.

In 2001, a federal court remanded the 1998 *Final Revised Sonoran Pronghorn Recovery Plan* to the Service with instructions to reconsider two areas of the 1998 plan that the court found to be contrary to the Endangered Species Act. Specifically, the court required the Service to establish:

> (1) objective measurable criteria, which, when met, would result in a determination that the pronghorn may be removed from the list of endangered species or, if such criteria are not practicable, an explanation of that conclusion and
>
> (2) estimates of the time required to carry out those measures needed to achieve the plan's goal and to achieve intermediate steps toward that goal where practicable, or if such estimates are not practicable, an explanation of that conclusion.

A supplement and amendment to the 1998 Recovery Plan, providing the required information, was published in 2003.

1.5.9 Wilderness Designation

In 1974, 337,449 hectares (833,500 acres) of the refuge were proposed to be included as part of the National Wilderness Preservation System (Senate Committee on Energy and Natural Resources). The proposal excluded approximately 14,975 hectares (37,000 acres) along the southern boundary known as the Tule Well exclusion, and a 183 meter (600 foot) corridor along El Camino del Diablo and the Christmas Pass Road. The proposal included adding the 32,375 hectare (80,000 acre) area known as Tinajas Altas to the refuge and designating 29,421 hectares (72,700 acres) of the parcel as wilderness. Congress directed that the Service manage all areas proposed for wilderness as de facto wilderness pending study and final designation.

A BLM study prior to 1990 indicated that a majority of the Tinajas Altas area had been impacted by surface military training and no longer possessed high or threatened cultural, wildlife, scenic or botanical resource values. Tinajas Altas was removed from the 1990 final wilderness proposal due to this degradation. The final proposal included the Tule Well Exclusion, and narrowed the travel corridors to 61 meters (200 feet), resulting in a wilderness proposal of 325,133 hectares (803,418 acres).

The Arizona Desert Wilderness Act of 1990 (HR 2570 Title 3) designated about 93 percent of the refuge, or 325,133 hectares (803,418 acres) as wilderness (figure 1.4). This designation provides a supplemental (i.e., additional) refuge purpose. The refuge's wildlife management responsibilities remain unchanged, but must be implemented within the context of legal requirements spelled out in the Wilderness Act of 1964. While the Wilderness Act does not prevent activities essential to the refuge's purpose, it does affect the manner in which these activities occur. For example, a minimum requirements analysis (MRA) is required to demonstrate that management activities are necessary and appropriate within wilderness. Permanent roads are prohibited. Temporary roads, use of motor vehicles, motorized equipment, landing of aircraft, other forms of mechanical transport, and structures and installations are also prohibited, except as minimally required to administer the area as wilderness. Additionally, wilderness designation calls for expanded monitoring requirements on the effects of public visitation.

The Arizona Desert Wilderness Act of 1990 provided two specific provisions relating to Cabeza Prieta for military activities and law enforcement border activities. The Act reads:

> Nothing in this title including the designation as wilderness of lands within the Cabeza Prieta NWR, shall be construed as–
>
> (1) precluding or otherwise affecting continued low-level over flights by military aircraft over such refuge, or the maintenance of existing associated ground instrumentation..."
>
> and
>
> (2) precluding or otherwise affecting continued border operations by the Immigration and Naturalization Service, the Drug Enforcement Administration, or the United States Customs Service within such refuge [now Department of Homeland Security and its bureaus],
>
> [both] in accordance with any applicable interagency agreements in effect on the date of enactment of this Act

The Act also allows the Secretaries of these agencies to enter into new agreements compatible with refuge purposes and in accordance with laws applicable to the Refuge System.

1.6 LEGAL AND POLICY GUIDANCE

Administration of refuge lands is guided by federal laws, by the mission and goals of the Refuge System, and by policy, Executive Orders, and international treaties. Short descriptions of the most important mandates and policies affecting this planning process for Cabeza Prieta NWR follow. Additional legal mandates can be found in Appendix A.

1.6.1 The National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended, by the National Wildlife Refuge System Improvement Act of 1997 (H.R. 1420, 105th Congress)

This law is the "organic act" for the National Wildlife Refuge System. The Act amends portions of the National Wildlife Refuge System Administration Act of 1966 and the Refuge Recreation Act, and gives the force of law to Executive Order 12996.

The Act clarifies that conservation of wildlife and its habitats is the first priority of the National Wildlife Refuge System.

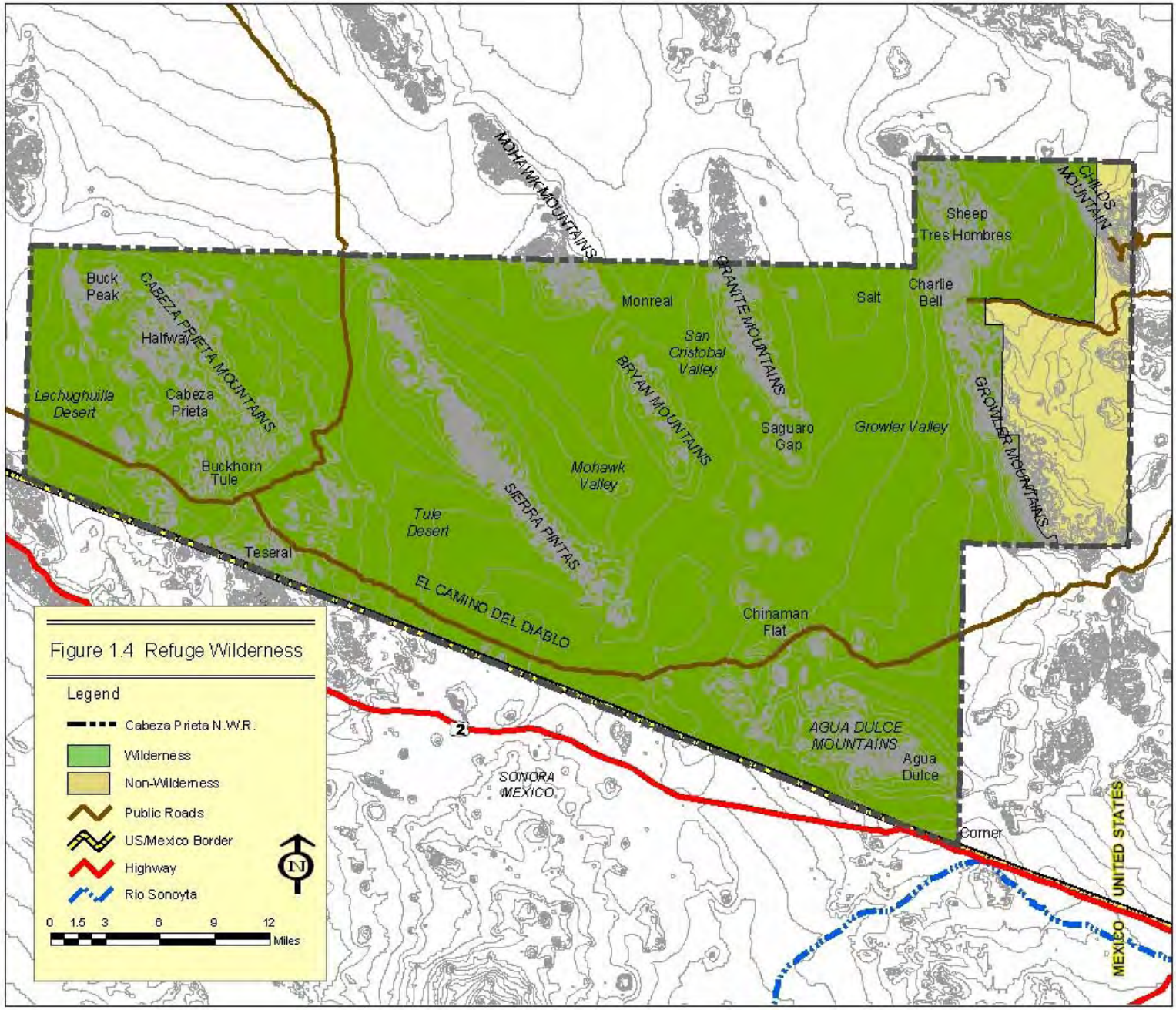
The Act unifies the Refuge System, calling for each refuge to be managed to fulfill the mission of the Refuge System, as well as specific purposes for which that refuge was established, and directing that each refuge shall be managed in a manner that maintains the biological integrity, diversity and environmental health (ecological integrity) of the Refuge System.

The Act establishes the legitimacy and appropriateness of six wildlife-dependent recreational uses of the Refuge System when they are determined to be compatible: hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation.

These priority public uses shall receive enhanced consideration over other public uses in refuge planning and management. The following general hierarchy between refuge activities and public uses will apply: Priority 1 - activities necessary to fulfill the refuge purposes and the Refuge System mission; Priority 2 - provide opportunities for wildlife-dependent recreational uses, when determined to be compatible. All other public uses will be a lower priority.

Compatibility was more clearly defined as a determination that the use would not materially interfere with or detract from the fulfillment of the mission of the Refuge System or purposes of the refuge based on the sound professional judgment of the refuge manager. Sound professional judgment is a finding, determination, or decision that is consistent with the principles of sound fish and wildlife management and administration, available science and resources, and applicable laws.

The Act also provides that Comprehensive Conservation Plans shall be completed for all refuge units within 15 years from the date of enactment.


MOHAWK MOUNTAINS
CHILDS MOUNTAIN
Sheep
Tres Hombres
Buck
Peak
CABEZA PRIETA MOUNTAINS
Halfway
Monreal
GRANITE MOUNTAINS
Salt
Charlie
Bell
San
Cristobal
Valley
BRYAN MOUNTAINS
Lechuguilla
Desert
Cabeza
Prieta
Saguaro
Gap
Growler Valley
GROWLER MOUNTAINS
Buckhorn
Tule
Mohawk
Valley
SIERRA PINTAS
Tule
Desert
Teseral
EL CAMINO DEL DIABLO
Chinaman
Flat
2
AGUA DULCE
MOUNTAINS
Agua
Dulce
SONORA
MEXICO
Corner
UNITED STATES
MEXICO
Figure 1.4 Refuge Wilderness
Legend
Cabeza Prieta N.W.R.
Wilderness
Non-Wilderness
Public Roads
US/Mexico Border
Highway
Rio Sonoyta
N
0 1.5 3 6 9 12
Miles

1.6.2 Wilderness Act of 1964 (16 U.S.C. 1131-1136)

The Statement of Policy of the Wilderness Act reads:

> In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness. For this purpose there is hereby established a National Wilderness Preservation System to be composed of Federally owned areas designated by Congress as "wilderness areas" and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness; and no federal lands shall be designated as "wilderness areas" except as provided for in this Act or by a subsequent Act. (Sec. 2 (a)).

The Act defines wilderness as

> . . . an area where the earth and community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1)generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value (Sec.2 (c)).

Key concepts include:

- The purposes of this Act are within and supplemental to the purposes for which . . . units of the national wildlife refuge system are established (Sec. 4 (a)).

- . . . each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such an area for such other purposes for which it may have been established as also to preserve its wilderness character (Sec. 4 (b)).

- Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized

equipment, ... no other form of mechanical transport, and no structure or installation within any such area (Sec. 4 (c)).

1.6.3 Arizona Desert Wilderness Act of 1990

Designated identified lands within Cabeza Prieta NWR as wilderness under Title III, to be administered in accordance with the Wilderness Act with special provisions to not preclude continued military or border law enforcement activities (previously described in Section 1.5.9, Wilderness Designation).

1.6.4 Endangered Species Act of 1973 (16 U.S.C. 1531-1543 87 Stat. 884) (P.L. 93-205)

The Endangered Species Act, as amended (Public Law 97-304 and the Endangered Species Act Amendments of 1982), did not specifically address the Refuge System, but does directly affect management activities within the Refuge System. The Act directs federal agencies to take actions that further the purposes of the Act and to ensure that actions they carry out, authorize or fund do not jeopardize endangered species or their critical habitat.

1.6.5 The Archeological Resource Protection Act of 1979 (ARPA) (P.L. 96-95, 93 Sta. 721, dated October 1979) (16 U.S.C. 470aa - 470ll)

ARPA requires a federal permit for the excavation, collecting, and removal of archeological resources from federal and tribal land. It prohibits vandalism of sites on federal and tribal land and the exchange or transport of illegally obtained archeological resources. ARPA violations are subject to civil and criminal penalties

1.6.6 Military Lands Withdrawal Act of 1986 (P.L. 99-606)

More than 93 percent of the refuge was withdrawn for military use as part of the Barry M. Goldwater Range (BMGR) (boundary corresponds with current wilderness boundary). Based on authorities granted in the Military Lands Withdrawal Act of 1986 (P.L. 99-606), a Memorandum of Understanding (MOU) between the Air Force and the Service was negotiated to clarify agency missions, objectives, and what activities would occur. The MOU, which was updated as recently as November of 1994, allows for military flights 457 meters (1,500 feet) above ground level (AGL) or 152 meters (500 feet), lower than the customary 610 meters (2,000 foot) AGL advisory issued by the Federal Aviation Administration (FAA). Military flights, along established training routes that are 7.4 kilometers (4 nautical miles) wide, have no minimum altitude restriction, per the agreement. The MOU also clarifies that the military's use of live fire would be confined to air-to-air weaponry and would be conducted at altitudes of 1,524 meters (5,000 feet) mean sea level (MSL) and higher after 60 days' written notice is provided the refuge manager. The military is using electronically scored aerial targets and will confine itself to that means unless mission requirements mandate the use of other methods. The military agreed that air-to-ground live fire will be restricted to designated tactical ranges outside the refuge. This act was to expire in 2001 unless renewed (see next paragraph).

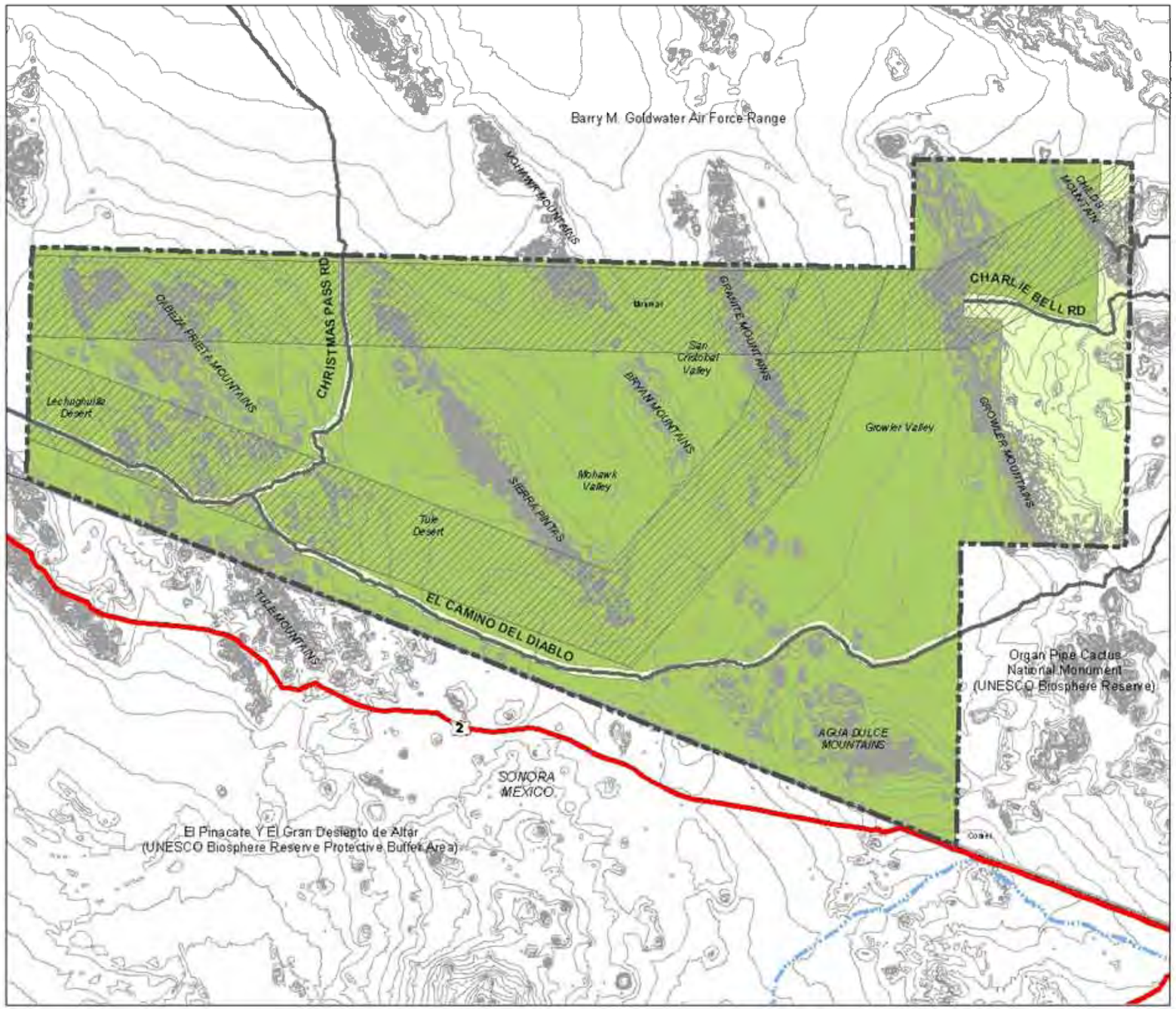


Figure 1.5 Low-Level Fixed Wing Overflight Corridors

Legend

- Cabeza Prieta N.W.R.
- Wilderness
- Non-Wilderness
- Public Roads
- US/Mexico Border
- Highway
- Rio Sonoyta
- 200' to 1500' AGL Flight Corridor

Sources: USFWS, 2003

0 1.5 3 6 9 12 Miles

N

CABEZA PRIETA
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE

1.6.7 Military Land Withdrawal Act of 1999 (Public Law 106-65)

This Act effectively removed Cabeza Prieta NWR from the BMGR, but under section 3032, provided for continued but limited military use of ground facilities on the refuge and extended the MOU of 1994.

The Act also provided for negotiated amendments to the 1994 MOU when the Secretaries of Navy or Air Force determine changes are essential to meet military aviation training needs to:

- Revise existing or establish new low-level training routes
- Establish new or enlarged areas closed to public use as safety zones
- Accommodate maintenance, upgrade, replacement or installation of existing or new associated ground instrumentation.

While this Act ended most military use of land resources on the refuge, the air space over the refuge remains part of the BMGR. Over flights were exempted from compatibility requirements as already provided for under the Refuge Improvement Act and the Arizona Desert Wilderness Act.

Amendments for upgrade or replacement of existing ground instrumentation or installation of new ground instrumentation are permitted to the degree that they are determined to individually and cumulatively create similar or less impact than existing ground instrumentation currently permitted by the Arizona Desert Wilderness Act.

1.6.8 American Indian Religious Freedom Act (1978) and Amendments of 1994.

Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

1.6.9 Executive Order 13007 - Sacred Sites (May 24, 1996)

Drafted and promulgated to promote accommodation of access to Native American sacred sites by Native American religious practitioners and to provide additional protection for the physical integrity of such sacred sites. The order supplements the protections afforded by the American Indian Religious Freedom Act Amendments of 1994, and the Religious Freedom Restoration Act of 1993. The Order charged the agencies to establish written guidance to ensure consistency with law and agency functions. That implementation document states under Section 5: “The Service will not allow the use of motorized vehicles in wilderness areas in the lower 48...” in reference to access to Native American sacred sites.

1.6.10 Other Guidance

1.6.10.1 Fulfilling the Promise

In 1998, as the Refuge System neared its 100th anniversary of 2003, the Service provided the opportunity for refuge managers, other employees, and conservation partners to chart a course for the next century at the first National Wildlife Refuge System Conference held in Keystone, Colorado. The participants reviewed the Refuge System's history and defined its future by reviewing a draft strategy called *Fulfilling the Promise*. An executive summary[2] listed 42 recommendations regarding wildlife, habitat, people, and leadership. An implementation team prepared a final document by the same title, which was released in 1999. *Fulfilling the Promise*[3] serves as a vision document for the Refuge System and a guide for refuge management and planning.

1.6.10.2 Policy Manuals and Plan

Agency policy manuals and plans further define and interpret legal mandates for resource managers. The Service Manual and Refuge Manual are currently being reviewed and revised. Updated portions of the Manuals are available at the Service website[4] Below is a list of some relevant policies and plans.

1.6.10.3 U.S. Fish and Wildlife Service Native American Policy (1995)

This Service policy defines the relationship between the Service and all Native American governments as "government to government." Issues relating to culture and religion will require the involvement of Native American governments in all Service actions and proposals that may affect Native American cultural or religious interests including archaeological sites. The chief strategy will be one of consultation.

1.6.10.4 Interagency Wilderness Strategic Plan 1995

As 1994 marked the 30th anniversary of the passage of Public Law 88-577, known as the "Wilderness Act," the federal agencies charged with the stewardship of the Wilderness Preservation System developed a broad strategic plan. The agencies include the Bureau of Land Management, the National Park Service, U.S. Forest Service, and Fish and Wildlife Service. By agreeing to the plan, the agencies rededicated and focused each agency's efforts to secure the benefits of wilderness as called for in the Wilderness Act. The Plan's management actions are identified and grouped into five broad topics: 1) Preservation of natural and biological values; 2) Management of social values; 3) Administrative policy and interagency coordination; 4) Training of agency personnel; and 5) Public awareness and understanding.

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[2]http://www.fws.gov/r9extaff/promise.html

[3]http://refuges.fws.gov/library/indes.html

[4]http://www.fws.gov

1.6.10.5 Wilderness Stewardship Training

Training in Wilderness Stewardship is provided by the Arthur Carhart National Wilderness Training Center (Carhart Center) in Montana in conjunction with the Service's National Conservation Training Center (NCTC). The Carhart Center is jointly operated by the four federal agencies with Wilderness Stewardship responsibilities (Fish and Wildlife Service, U.S. Forest Service, Bureau of Land Management, National Park Service).

1.7 REFUGE PURPOSES

- The Cabeza Prieta NWR was established January 25, 1939, as Cabeza Prieta Game Range (Range) by Executive Order 8038: "for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources...(and) that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve shall be available for livestock. . . .".

- Enactment of the Arizona Desert Wilderness Act of 1990 designated most of the refuge wilderness and created the supplemental refuge purpose of wilderness protection, in accordance with the Wilderness Act of 1964.

- In addition to the original refuge purposes and the additional wilderness purpose created by the Arizona Desert Wilderness Act of 1990, several federal policies, regulations, and laws affect refuge management activities. Preeminent among these is the Endangered Species Act of 1973, which mandates protection and recovery of threatened and endangered species.

1.8 REFUGE VISION STATEMENT

1.8.1 At Cabeza Prieta National Wildlife Refuge, wildlife conservation comes first.

Cabeza Prieta National Wildlife Refuge is dedicated first and foremost to conservation of wildlife and habitats. Situated on the international border, and located in the heart of the Sonoran Desert, the refuge is unlike any other wild place in the Western Hemisphere. More than 90 percent of this unit of the National Wildlife Refuge System has been officially designated a Wilderness Area by Congress. The refuge's high diversity of plant and animal species and varied geology make it an important component of the Sonoran Desert ecosystem. The Service's role at the refuge is to protect native wildlife and plant populations within the greater Sonoran Desert ecosystem.

Desert Bighorn Sheep at Cabeza Prieta

USFWS Photo

1.8.2 Proactive management is important to the recovery and conservation of endangered species

The refuge plays a continuing role in the protection and recovery of threatened and endangered species, including the Sonoran pronghorn and the lesser long-nosed bat. The refuge is a critical resource for the

recovery of the Sonoran pronghorn, an endangered sub-species of American pronghorn limited to two small remnant populations in the United States and Mexico. The refuge comprises nearly half the range of the U.S. population, and is central to its recovery. Cooperatively with partners, especially the Arizona Game and Fish Department (AGFD), the refuge will continue its commitment to biological data gathering, monitoring, and analysis so that current natural resource management questions can be answered and the future of threatened and endangered species such as the pronghorn will be more secure.

1.8.3 Refuge wilderness resources are protected for posterity

The refuge, with its vast wilderness including Sonoran Desert habitat, is permanently protected as a component of the National Wilderness Preservation System. Protection of the existing landscape and management of the refuge's wildlife populations are top priorities. Desert bighorn sheep are recognized as a wilderness resource, as well as a species basic to the original purpose of the refuge. Conservation of this species, and other native species, will require a cooperative effort between the refuge and its partners, especially with the AGFD, using the best available science, established practices and new approaches and techniques based on the most current research.

Cabeza Prieta Peak, showing the "Dark Head" from which the refuge takes its name

USFWS Photo

1.8.4 The beauty and solitude of the refuge will continue to be enjoyed by visitors.

The refuge is, and will remain, a place where visitors can enjoy the magnificence of the Sonoran Desert and experience wilderness solitude rarely found elsewhere in the Southwest. Refuge interpretive programs will continue to educate visitors and area residents about the unique resources of the Sonoran Desert and the mission of the refuge and the National Wildlife Refuge System. Visitors to the refuge; whether enjoying an extended backpacking trip, a day's drive on the Camino del Diablo, or an informational session at the visitor center; are drawn to its beauty and untrammeled wilderness character. These traits will be protected through Service management and administration.

1.8.5 The refuge embraces cooperative working relationships with partners.

Volunteers clear brush along Charlie Bell Road

USFWS Photo

The refuge values its relationships with other natural resource agencies, tribal governments, non-governmental organizations, and local communities in accomplishing the refuge purposes and the National Wildlife Refuge System mission. Local communities will continue to identify and promote the region as a tourist destination. The unique resources and natural beauty of the refuge will continue to draw visitors. Refuge outreach and visitor services programs will continue to enhance the area's attraction to visitors from around the nation and foreign countries. The refuge will continue to be an ideal site for cooperative scientific study and research leading to the conservation of Sonoran Desert resources.

1.9 REFUGE MANAGEMENT DIRECTION: GOALS AND GUIDING PRINCIPLES

The following four goals are proposed for Cabeza Prieta NWR. They are consistent with the refuge purpose, the Refuge System mission and goals, the National Wildlife Refuge System Administration Act of 1996, as amended, Service policy, the Wilderness Act of 1964, the Arizona Desert Wilderness Act of 1990, and the Service's Gila/Salt/Verde Ecosystem Team goals. The goals are to be considered as integrated goals containing elements of each, rather than being mutually exclusive of each other[5]. Specific objectives to be achieved to realize these goals, as well as implementation strategies for each objective have been developed. The objectives and strategies for implementing Alternative 4, the preferred alternative, are presented in Appendix M. Management actions proposed in support of the goals are described in Chapter 2, Alternatives.

1.9.1 Wildlife and Habitat Management

Protect, maintain, enhance, and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran desert represented at Cabeza Prieta NWR.

- Intact habitats are key to viable wildlife populations.
- The refuge must integrate its responsibilities for trust species and biodiversity to meet Refuge System and ecosystem goals.
- Management should mimic, where possible, natural processes.
- The refuge needs sound scientific data in order to evaluate management options and prioritize activities.

1.9.2 Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will conserve, maintain and where possible, restore the wilderness character of Cabeza Prieta NWR.

1.9.3 Visitor Services Management

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding, and protection of the plant, animal and wilderness resources.

- Compatible wildlife-dependent recreation and education are appropriate public uses with priority given to hunting, fishing, wildlife observation, wildlife photography, environmental interpretation, and education.
- Visitors find national wildlife refuges welcoming, safe, and accessible with a variety of opportunities to enjoy and appreciate America's legacy of wildlife.
- The heritage and future of the Refuge System is intertwined with the support of concerned citizens.

[5] Following each goal is a list of management principles and requirement developed for the Service's vision document *Fufilling the Promise* and other sources.

1.9.4 Cultural Resources Management

Protect, maintain, and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations.

- Comply with Section 106 of the National Historic Preservation Act and enforce the Archeological Resources Protection Act to protect sites and objects from construction impacts or illegal activities.
- Archeological research proposals will be in compliance with the Archeological Resources Protection Act and will undergo formal review by regional recognized tribes.
- The location of sites will not be disclosed.
- Report site and object discoveries and report specific site maintenance, stabilization, and protection needs to the Service's Regional Office.
- Observe and honor the provisions of the American Indian Religious Freedom Act and Executive Order 13007 to guarantee access by tribal members to sacred sites and to traditional cultural properties.
- Limit archives and collections to the minimal amounts essential for Refuge record keeping and for basic public interpretation. All other collections will be housed in public repositories and may become candidates for repatriation to regionally recognized tribes.

1.10 STEP-DOWN PLANS

Step-down management plans detail and describe specific activities necessary to achieve objectives or implement management strategies identified in the CCP. The Service has chosen to incorporate the Wilderness Stewardship Plan in this CCP. Other step-down plans to be prepared for the refuge include a habitat management plan, visitor services management plan, inventory and monitoring plan, safety plan and integrated pest management plan. Step-down plans may require additional NEPA compliance and the opportunity for public review.

1.11 DESCRIPTION OF THE PLANNING PROCESS

1.11.1 Notice of Intent for Environmental Impact Statement and CCP

Between 1994 and 1997 the Service prepared the *Final Programmatic Environmental Assessment for the Future Management of Cabeza Prieta National Wildlife Refuge and Draft Comprehensive Conservation Plan.* In 1999, the Department of the Interior withdrew that document and requested that the Service prepare a new CCP for the refuge. In January 2000 the Service's Southwest Regional Director determined that an Environmental Impact Statement should be prepared for the CCP because of the national significance of the wilderness and other refuge resources, and the potential impacts of implementing the alternatives analyzed. A Notice of Intent (NOI) to prepare an EIS and CCP was published in the Federal Register April 14, 2000. The NOI identified issues that had been developed during the EA process, outlined four potential alternatives that had been discussed up to that date, and requested public input on these preliminary issues and range of alternatives through written comments. It also announced the dates and locations for three Open Houses to be held in June 2000. The written comment period was open for 30 days, but comments were received through the end of the Open Houses in June. An interdisciplinary team was selected to assist in preparation and review of the EIS/CCP.

1.11.2 Refining Issues Through Public and Agency Scoping

Throughout the EIS effort the Service has periodically mailed planning updates to more than 1,000 organizations, agencies and individuals. The updates reiterated information presented in the NOI, provided information about plan development status, and invited input through written comments and open houses or public meetings. Open houses were held in Yuma, Ajo, and Tucson in June 2000. Attendance for each was 34, 5, and 56 respectively. The Service also received over 600 written responses. Agency scoping meetings were held with U.S. Border Patrol, OPCNM, Pima County, and the Tohono O'odham Nation. The refuge participated in joint scoping with BMGR and serves on their EIS team. A round of informal public meetings was held as follows: January 7, 2003, in Tucson; January 8, 2003, in Ajo and January 9, 2003, in Yuma. As a result of public scoping, a few new issues were added and others were re-worded. Although most respondents were satisfied with the range of alternatives, a large group expressed its desire to expand active management, while another group pressed for complete elimination of all vehicular traffic.

1.11.3 Gathering Information, Assessing Resource Relationships, Analyzing Environmental Effects and Rewriting the Plan

The planning team reviewed and revised the issues, developed a range of management alternatives, suggested additional investigations needed for an EIS, and reviewed the analysis of effects for each alternative in the Draft EIS, CCP and WSP. The Service solicited comments on the Draft EIS,CCP and WSP from members of the public, local, state and federal agencies, and NGOs between May 5 and September 14, 2005. In addition to the opportunity to submit written comments during this period, interested parties were also invited to attend public hears held at Tucson (July 25, 2005), Sells (July 26, 2005), Ajo (July 27, 2005), and Yuma (July 28, 2005), Arizona. Comments received are presented as Appendix C to this document. Revisions made in response to comments are contained in the EIS, WSP and CCP text and summarized at Appendix D. Upon release of the Final EIS there will be a 30 day comment period, followed by a formal Record of Decision issued by the Service's Southwest Regional Director.

1.11.4 Guidance Used for Preparation of a CCP/WSP/EIS

The process used for the development of this CCP/WSP/EIS has been guided by:

- The provisions of the National Wildlife Refuge Improvement Act of 1997 (P.L 95-616),
- the original purposes for which the Cabeza Prieta NWR was established (Executive Order 8038),
- the supplemental purpose of endangered species recovery added by the Endangered Species act of 1973, as amended,
- the supplemental purposes of wilderness administration added by virtue of the Arizona Desert Wilderness Act of 1990 designation,
- the provisions of the National Environmental Policy Act of 1969 (NEPA) and Council for Environmental Quality (CEQ) Regulations for Implementing NEPA (43 CFR 1500-1508),
- the Refuge Planning Chapter of the Fish and Wildlife Service Manual (Part 602 FW 2.1),
- the Wilderness Management Planning Chapter from the Refuge Manual (6RM Chapter 8), and
- the reports and recommendations of the Promises Implementation Teams.

1.12 PLANNING ISSUES

Issues, concerns, and opportunities were identified through discussion with the planning team, key contacts, a focus group, and through the public scoping process. The following issues were identified. The questions that follow each issue are not exhaustive, but only representative of questions and concerns that have been brought forward in this planning effort.

1.12.1 Wildlife and Habitat Management

The refuge was originally established for the conservation and development of natural wildlife resources and will continue to be managed for wildlife first. While emphasis will be placed on maintaining and enhancing habitat for desert bighorn sheep and the endangered Sonoran pronghorn, conservation and management of all native wildlife species and their habitats will continue to be one of the primary goals of the refuge.

- What were natural wildlife population levels prior to European influence?
- What effect has the introduction of domestic animals and grazing had on native wildlife and habitats?
- What, if any, level of habitat manipulation is appropriate?

1.12.2 Managing Healthy Ecosystems

(drawing by Bonnie Swarbrick)

Two goals of the Refuge System are to manage for healthy natural populations of native flora and fauna and to contribute to broader ecosystem goals.

- What were natural conditions on the refuge prior to European settlement?
- To what extent should the refuge attempt to recreate those conditions?
- What inventories and monitoring studies need to be conducted to determine refuge resource conditions and their status over time?
- Are there threats to the ecological integrity of the ecosystem? If so, what should be done to address these threats?
- How should the refuge contribute to migratory bird conservation?
- What are the priorities for research?
- What role should the refuge play in promoting a wider understanding and cooperative management of the Sonoran Desert Ecosystem?

1.12.3 Endangered Species Management

The refuge provides protection and habitat for the endangered Sonoran pronghorn and lesser long-nosed bat. The Refuge assumed leadership of the Sonoran pronghorn recovery effort in the United States in 1988. Past management for the pronghorn included removing livestock grazing from the refuge, removing and/or modifying fences to allow for pronghorn movement, adding water developments, fencing parts of the boundary to prevent trespass from neighboring cattle, and various studies of pronghorn movements and habitat use. Recently, experimental forage enhancement plots and addition of more water developments has been proposed. Little management activity, other than surveys and monitoring of roosting sites, has occurred for the lesser long-nosed bat.

- What role should radio collaring of animals on the refuge play in recovery of the Sonoran pronghorn?
- Are there critical pronghorn use areas and are they adequately protected?
- What is the role of developed waters and forage enhancement plots in pronghorn recovery? Are there any adverse aspects of developed waters or forage enhancements on pronghorn?
- What types of potential partnerships with Mexico would best assist in recovery?
- What role should the refuge play in experimental management strategies?
- What role should the refuge play in recovery of the lesser long-nosed bat?

1.12.4 Desert Bighorn Sheep Management

(drawing by Bonnie Swarbrick)

The refuge provides important habitat for desert bighorn sheep. The protection and conservation of desert bighorn sheep were central to refuge establishment. Previous refuge management for desert bighorn sheep included removal of livestock grazing, water developments, and control of hunting. Debate over the necessity of water for desert bighorn sheep survival and population health, refuge access in the wilderness area to maintain and/or haul water to developments,

creation of new waters versus removal of some or all of the existing water developments, continues to be at the heart of issues raised about refuge management of this species.

- Should a numerical population goal for desert bighorn sheep on the refuge be established?
- If so, what population goal is appropriate?
- What should this goal be based on? What was the population prior to European settlement of the area? What changes have taken place since settlement that affect desert bighorn sheep numbers?
- What is the role of water developments in desert bighorn sheep management on the refuge? What level of their use is necessary for a healthy population?

- What management strategies are necessary to achieve the population goal?

1.12.5 Predator Management

Predator control is a component of population management. Existing policy outlines acceptable methods and situations for predator control. Refuge policies prohibit the use of poisons for control of mammals or birds, and prohibit the use of chemicals that can cause secondary poisoning.

(drawing by Bonnie Swarbrick)

- What role, if any, should control of coyote, mountain lion and bobcat play as a management option on the refuge to protect Sonoran pronghorn, desert bighorn sheep and other wildlife populations?
- How does predator control fit with wilderness management principles?
- Should current policies on predator control be re-visited as new information about predator/prey relationships comes to light?

1.12.6 Wilderness Stewardship

Cabeza Prieta Wilderness is the largest refuge wilderness in the contiguous 48 states. In *Fulfilling the Promise*, the Service calls for elevating the status of wilderness areas by "acknowledging wilderness as a unique resource, the management of which is a specialized discipline." Natural populations of native wildlife are important to the wilderness resource, as are solitude and self-sustaining ecological processes.

Wilderness designation does not lessen the priority of the original refuge purposes, but it adds securing an enduring resource of wilderness, and preservation of wilderness character as additional purposes. These, in turn, require managerial restraint. All management activities in wilderness are subject to a MRA to assure appropriateness.

The refuge staff, AGFD, and refuge permittees (researchers, volunteers working on projects) may use mechanical or motorized transport and/or motorized equipment in the wilderness for management purposes subject to the Wilderness Act and Service policy. The use of mechanical/motorized equipment in wilderness by these entities is evaluated through MRA. DHS bureaus (U.S. Customs and Border Protection [CBP] and CBP Office of Border Patrol [CBP-BP]), may drive in the wilderness to accomplish their missions, in accordance with any interagency agreements, per special provisions in the Arizona Desert Wilderness Act of 1990.

- What wildlife and habitat management activities are appropriate for the wilderness area?
- Has anything negatively affected or degraded wilderness resources or character? If so, what rehabilitation projects or management changes are needed to restore wilderness resources or character?
- How can the refuge best manage wildlife and wilderness resources and character?
- Is long-term, continuous management intervention appropriate in wilderness?

1.12.7 Wildlife Dependent Visitor Services

The Refuge Improvement Act identified hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation as priority public uses on refuges when found to be compatible with refuge purposes. Under current management the refuge is open to several of these uses. Its size, remoteness, wilderness character, and desert environment offer a unique experience for visitors.

1.12.7.1 Recreation in Wilderness

The Wilderness Act allows for public recreation and education by recognizing that wilderness provides "outstanding opportunities for solitude or a primitive and unconfined type of recreation" and calls for wilderness areas to be "administered for the use and enjoyment of the American people in such a manner as to leave them unimpaired for future use and enjoyment as wilderness." Furthermore, Service policy recognizes sensitive areas may need to be protected from overuse, and allows for regulated use through permit or complete closure (6 RM 8.9A).

- What level of public use is sustainable and desirable in the wilderness?
- What management methods are appropriate for controlling public use in wilderness?
- How should the refuge best monitor visitor impacts?
- What should trigger remedial actions and public information campaigns?

1.12.7.2 Permitting and Access

Permits were established in 1975 at the request of the U.S. Air Force to inform the public of military hazards (e.g., unexploded ordnance) they may encounter on military withdrawal lands and to obtain hold harmless signatures. They also serve to establish initial contact with the public, ensure that visitors are aware of refuge and wilderness regulations, provide the refuge with public use data, and inform visitors of the natural hazards of the desert environment.

- Should the refuge continue to have a visitor permit system? If so, how should it be structured? Should it be separate from the Barry M. Goldwater Range permit?
- How can the refuge limit visitor impacts, while providing a quality visit?
- Should access to wilderness be zoned?
- Should the refuge visitor center hours be extended?

A group of hikers receives information from refuge staff

USFWS Photo

1.12.7.3 Motorized Access and Vehicle Restrictions in Non-Wilderness

Visitors and local residents have expressed an interest in additional vehicular access to non-wilderness areas of the refuge.

- Should the refuge seek to increase visitor use from current numbers?
- Should the refuge provide a non-wilderness road that does not require 4WD or a high-clearance vehicle?
- Should the refuge rehabilitate Copper Canyon Road in cooperation with the BLM for use as a public tour loop?

1.12.7.4 Hunting

The refuge is currently open to desert bighorn sheep hunting for which the State issues limited permits each year. In addition to the actual hunt, permittees usually make several scouting trips in advance of the season. Desert bighorn sheep hunters must obtain a special use permit for their hunts.

Successful desert bighorn sheep hunter on the refuge

USFWS Photo

- What type of hunting experience should be offered at the refuge?
- Is hunting for deer and/or small game appropriate at the refuge?
- Are there any wildlife conservation conflicts with the current hunt program?

1.12.7.5 Environmental Education and Interpretation

The refuge has an office/visitor center located in Ajo that offers an orientation video and exhibits. Visitor services also include a watchable wildlife area on Child's Mountain with interpretive panels and shade structures. This facility is open by arrangement only for guided tours. The refuge has an Outdoor Recreation Planner as well as several volunteers who staff the visitor center, conduct tours, and offer monthly natural history programs coordinated by the Cabeza Prieta Natural History Association during the winter season.

Guided tour group at the Childs Mountain Overlook

USFWS Photo

- What projects and activities should the refuge initiate to increase understanding and protection of Sonoran Desert resources and the role the Service plays in support of the ecosystem?

- Should the refuge develop educational programs specific to wilderness values, solitude, and the conservation of wilderness resources in general?

A party of car campers near El Camino del Diablo

USFWS Photo

1.12.7.6 Other Public Uses: Backpacking and Camping

Other uses that are permitted because they are related to participation in priority public uses or are enhanced by a wilderness setting include hiking and backpacking (including camping), and commercial recreation operations.

- What types of recreational uses should the refuge allow other than the six priority public uses?
- What educational efforts should be undertaken to minimize the impacts of these activities?
- What level of recreational use monitoring is appropriate?
- What level of border law enforcement activity or illegal cross-boarder travel detracts from visitor experiences?

1.12.8 Cultural Resource Management

The refuge has many sites of cultural and /or historical significance.

- What actions should the refuge take to better identify, document, interpret, and protect cultural and historical resources?
- How should the refuge identify American Indian interests and what cooperative efforts can be considered and set in place prior to taking action?
- What can the refuge do to provide access for Native Americans to sacred sites?

1.12.9 Border Law Enforcement

CBP-BP, Customs, and DEA (currently CBP and CBP-BP) were given special provisions by the Arizona Desert Wilderness Act of 1990 to permit continued enforcement activities. The number of illegal border crossings has climbed steadily over the past several years, and impacts to refuge resources, both from illegal traffickers and the agents performing their duties, are evident.

- To what degree are illegal drug trafficking, illegal immigration and associated law enforcement activities impacting wildlife, habitat and the visitor experience?
- To what degree should the refuge monitor these effects?
- What cooperative efforts can be implemented to reduce impacts?
- Should the refuge develop humanitarian waters or other rescue features in the refuge wilderness?

1.12.10 Military Use

The refuge was not included in the last military withdrawal, but language in the Arizona Desert Wilderness Act does stipulate continued military use (over flights and limited ground use). The Act amends the current MOU with the military and provides for amendments to revise low-level training routes; to establish new or enlarged buffer zones closed to the public; and to accommodate maintenance, upgrade, replacement, or installation of existing or new ground instrumentation (i.e. communication sites) that does not increase impacts already permitted under the Arizona Desert Wilderness Act of 1990.

- What effect does military over flight activity have upon native wildlife?
- What would be the effect of any decrease in flight-level restrictions?
- What buffer zones are needed to ensure public safety?
- What changes are being proposed and how will these affect refuge resources?
- How can the refuge reduce impacts caused by authorized military operations (tow dart and other debris removal, accident response protocol, entry without permit, expansion of low level flights)?

1.13 ISSUES NOT SELECTED FOR DETAILED ANALYSIS

The following areas of concern have been noted by the Service. Some issues raised early in the EA process were resolved through separate Environmental Analysis, others are resolved by current policy or law and implementation of the CCP would have no impact on these issues. Finally, there is a group of issues that are beyond the scope of this plan. The issues and their resolution are discussed briefly below**.**

1.13.1 Issues Completed Under Separate Environmental Assessments

1.13.1.1 Air Force Station (AFS) at Childs Mountain

The Air Force issued a draft EA in July 1995 proposing to demolish and remove a large portion of abandoned facilities at the Ajo Air Force Station located on Childs Mountain. A Finding of No Significant Impact (FONSI) was issued in January 1996. The FONSI states that ". . . because of the remoteness of Childs Mountain, there are no surrounding activities that would increase the impacts of the proposed demolition action. Implementation of the proposed action does not include any growth-inducing impacts. If anything, the demolition and removal of the Ajo AFS would decrease the ongoing military activities in southern Arizona." The final EA and FONSI are hereby incorporated by reference.

1.13.1.2 FAA Surveillance Radar on Childs Mountain

The FAA released an EA and FONSI in February 1998 as part of its national program to modernize the Joint Use En Route Radar Systems along the perimeter of the continental United States. The ARSR-4 radar facility serves as a civilian and military aircraft tracking system and as a border surveillance system for CBP-BP. The EA discussed the potential impacts that might occur during the construction and operation of the proposed ARSR-4 facility at Childs Mountain. The FAA constructed an ARSR-4 facility on the summit of the mountain, and in the process removed Building 56, a large "hardened structure" designed

to withstand nuclear warfare. The work was managed under an MOU between the FAA, Military and USFWS. The final EA and FONSI are hereby incorporated by reference.

1.13.1.3 Watchable Wildlife Site on Childs Mountain

An Environmental Assessment for construction of a Watchable Wildlife Site on Childs Mountain was completed in October 1998 and is incorporated by reference. The site includes interpretive panels, shade structure, improved parking area, a graveled trail and rock work. Caution was used to protect existing vegetation and construction was timed to reduce impacts to desert bighorn sheep in the area. Access to the area is controlled by a locked gate and a permit and military hold harmless agreement is required. In fiscal year 2003 approximately 300 people visited the summit.

Interpretive Panel at Childs Mountain Watchable Wildlife Site

USFWS Photo

1.13.2 Issues Covered by Existing Policy, Law, or Regulations and Common to All Alternatives

1.13.2.1 Border Law Enforcement Activities

Some participants wanted to close all administrative trails within wilderness to vehicular use. The Arizona Desert Wilderness Act of 1990 allows the Border Patrol(currently BBP-BP), Customs and DEA to continue to conduct illegal alien and drug interdiction activities on the refuge including motor vehicle use in wilderness. These activities are governed by mutual agreement and outlined in an existing MOU. DHS, responding to great increases in illegal border traffic in recent years, and the hazards that undocumented aliens (UDAs) and other illegal traffickers face in crossing the Sonoran Desert, developed the Arizona Border Initiative in March of 2004. This initiative greatly increased the border law enforcement resources present in southern Arizona, in an effort to reduce the tide of illegal cross-border traffic. The initiative also calls for expanded use of motorized law enforcement vehicles in the wilderness.

The refuge recognizes the need for border enforcement to deter illegal traffic, which is responsible for significant habitat damage, disturbance of wildlife and degradation of wilderness character, and to prevent potential threats to public safety. The refuge will continue to work cooperatively with CBP-BP, CBP, and DEA to deter illegal drug trafficking and alien trespass, but will work to reduce impacts caused by this authorized use.

Abandoned bicycle
USFWS Photo

A national MOU was established in among DHS and Department of the Interior and Department of Agriculture bureaus that manage land (Appendix B) in March 2006. This MOU supersedes earlier agreements. In 1999, Tucson Sector Border Patrol and FWS Region 2 produced the training video, *Patrolling in a Desert Ecosystem* that addresses environmental concerns. Each station in the Tucson Sector was provided a copy and all agents viewed it. New agents are required to view the video when they arrive at their new duty station. The Tucson Sector has given a copy to the Yuma Sector, which may also adopt the same procedures**.** Additionally, the refuge conducts orientations

for new CBP-BP agents as needed to inform agents of endangered species, wilderness, and other environmental issues.

1.13.2.2 Fire Management

General Service policy is to control all wildfires in the Refuge System, including those within designated wilderness areas (6RM 7) unless an approved fire management plan provides for nonsuppression under certain circumstances (low risk of fire spreading to non-refuge lands and no significant threat to public health or safety). Prior to 2005, it was believed that no habitat capable of supporting prescribed burning existed on the refuge. Most natural fires, if discovered, burned out before suppression efforts would begin. However, after periods of above average rainfall fuel loads capable of carrying fire can develop. Human Activity (e.g., smuggling and interdiction) provides potential ignition sources. Because of this, a fire management plan will be developed for the refuge in the future. Methods of fire management used in designated wilderness will meet MRA.

1.13.2.3 Trespass Livestock

Trespass and feral animals are not permitted on refuge lands (50 CFR 26.21 b). The Service aggressively removes all trespass livestock. Methods of removal are determined on a case-by-case basis subject to MRA in wilderness. The refuge will attempt to work with the Mexican and U.S. ranchers to prevent or curtail trespass incidents. Any necessary fencing will be designed to allow free movement of pronghorn.

1.13.2.4 Pets

No unconfined domestic animal may enter or roam at large upon any national wildlife refuge (50 CFR 26.21 b). The refuge requires all pets to be leashed and under the control of the owner at all times.

1.13.2.5 Firearms

Refuge regulations (50 CFR 27:42) permit possession, use, and transport of firearms on refuges only for the purpose of participating in authorized public hunting programs. Firearms must be unloaded and cased when transported on refuge roads.

1.13.2.6 Commercial Uses

There were several questions about policy regarding commercial use of the refuge. The only commercial uses currently occurring on the refuge are tour groups and hunting guides. Policy regarding commercial use can be found in Commercial and Appropriate Uses 630 FW3 and FW5. These uses must be determined to be appropriate refuge uses and compatible with refuge purpose(s) as outlined in Appropriate Uses 603 FW1 and Compatibility 603 FW2. Valid mineral claims in existence when the refuge was created are to be administered according to 603 FW1. All commercial uses require a special use permit issued by the refuge manager and include the above determinations.

1.13.2.7 Congressional Intent in the Arizona Desert Wilderness Act of 1990

Members of the Yuma Valley Rod and Gun Club and the Arizona Desert Bighorn Sheep Society have questioned whether or not congressional intent in the enactment of this law permitted vehicular use to maintain water developments. The solicitor for the Southwest Region of the Service provided the refuge with a verbal opinion that under the Wilderness Act of 1964 the refuge has authority to manage for wildlife, and to use a vehicle in instances where it is determined to be the minimum tool needed to accomplish necessary management, but that there are no special provisions in the Arizona Desert Wilderness Act of 1990 exempting the refuge from making the MRA.

The refuge must take the opportunity to review its management practices and their effectiveness in meeting refuge purpose(s), mission, goals and objectives in the CCP process.

1.13.3 Issue to be Determined Pending Adoption of Wilderness Policy Revisions: Wheeled Game Carriers

The Wilderness Act prohibits the use of mechanical transport except as necessary to meet minimum requirements for administration. Although other agencies (NPS, FS, and BLM) all defined this term in their policies, the Service did not further define mechanical transport in the Refuge Manual under 6RM8 Wilderness Area Management (1986). In general terms, the use of mechanical transport for recreation cannot be allowed by MRA. However, if the refuge manger determines that the use of wheeled game carriers is needed to effectively administer a hunt, facilitate data collection, or meet specific management objectives; then mechanical transport may be authorized if found to be the minimum tool necessary. Until Service policy clarifies the issue, use of wheeled game carriers on refuge wilderness will be at the discretion of the refuge manager, subject to compliance with the Wilderness Act of 1964.

1.13.4 Issues Beyond the Scope of this Plan

1.13.4.1 Remove Wilderness Designation

Only Congress has the ability to establish or remove wilderness designation.

1.13.4.2 Turn the Refuge over to the State

Only Congress has the ability to remove lands from the National Wildlife Refuge System. While there are examples of cooperative management of visitor services by the State on a few refuges, there have been no instances where a refuge has been dissolved or transferred to a state agency.

1.13.4.3 Sonoran Desert National Park Proposal

A proposal to form the Sonoran Desert National Park has been developed by a private organization. The proposal is a citizen proposal and does not originate from the Department of Interior or National Park Service. This proposal is not to be confused with the recommended name change from OPCNM to the Sonoran Desert National Park that was proposed in the OPCNM 1997 General Management Plan, or the recent creation of the Sonoran Desert Monument on BLM lands northeast of the refuge. Congressmen Morris Udall first proposed the formation of a park comprised of OPCNM, Cabeza Prieta Game Range, and BLM lands in 1965. Only Congress can change the designation of a National Wildlife Refuge.

While this alternative is beyond the scope of this plan, many of the ideas suggested by the citizen group will be similar to those found in alternatives presented in Chapter 2. Separate management plans developed by the BMGR, OPCNM, and Cabeza Prieta NWR do not preclude these agencies from developing a comprehensive regional plan which could take the form of multi-agency cooperation under one of several existing teams such as the Barry M. Goldwater Executive Committee.

1.13.4.4 Additional Acquisitions

Comments were received asking that the refuge acquire additional lands for resource protection, specifically the Tinajas Altas to the west, and rangelands on the east which are part of the BLM's Lower Gila Resource Area. The refuge is completely surrounded by federal lands or Mexico except at headquarters in town. This option would require transferring BLM lands to the FWS.

Although several proposals in the past have included adding Tinajas Altas to the refuge, legislation has so far precluded the addition. Most recently, Congress authorized the BMGR to manage the natural resources on the west side, including Tinajas Altas, and required the completion of an EIS within two years. The BLM has identified certain lands it would like to divest to other federal agencies, but did not identify the lands on the refuge's east boundary. The refuge has not identified lands other than 12 hectares (30 acres) adjacent to refuge headquarters for acquisitions. The refuge seeks to work cooperatively with the BLM to achieve resource protection on neighboring lands.

1.14 EXISTING PARTNERSHIPS, COORDINATION AND COOPERATION

1.14.1 Interagency Cooperation

1.14.1.1 Arizona Game and Fish Department (AGFD)

A requirement to cooperate and coordinate with State wildlife management agencies is clearly stated in laws governing the National Wildlife Refuge System (National Wildlife System Administrative Act, of 1966, as amended; Fish and Wildlife Act of 1956, as amended). While ultimate authority to manage wildlife resources on refuge lands rests with the Service,[6] **s**tate wildlife agencies have authority to manage wildlife

[6]In 1976 the Supreme Court, in Kleppe v. New Mexico, recognized the Constitution's provision of Federal authority to regulate wildlife on Federal lands. These powers are paramount to those of the States and, to the extent that Congress uses them to

resources unless there is a conflict with a defined federal interest. In the spirit of cooperative federalism, state wildlife managers are invited to participate in the refuge comprehensive conservation planning process.

The AGFD has been a full partner assisting the refuge in aerial surveys, managing the desert bighorn sheep hunt, and wildlife surveys, and has served as a member of the Sonoran Pronghorn Recovery Team. Additionally, the Refuge Improvement Act of 1997 requires refuges to consult with adjoining Federal, State, local, and private landowners and affected State conservation agencies in the development and revision of CCPs. AGFD administers the annual desert bighorn sheep hunt on the refuge, and AGFD staff members have participated in the CCP process as members of the planning team. Ultimate decisions regarding refuge management rest with Service.

1.14.1.2 Barry M. Goldwater Range Executive Council (BEC)

The BEC was formed August 1997 to provide a forum to enhance management of natural and cultural resources on the BMGR by teaming various state and federal agencies into a collaborative management council. The BEC addressed resource management issues and conflicts arising from land uses on the BMGR or affected by the BMGR with the intention of resolving those issues and conflict. The BEC met approximately six times a year, with subcommittees such as the Pronghorn Recovery Team meeting as required. Membership was limited to agencies having direct responsibility for lands or resources on or directly affected by military or other activities on the Range. The committee developed a unified permit system for public access to the entire area under federal administration instead of separate permit systems.

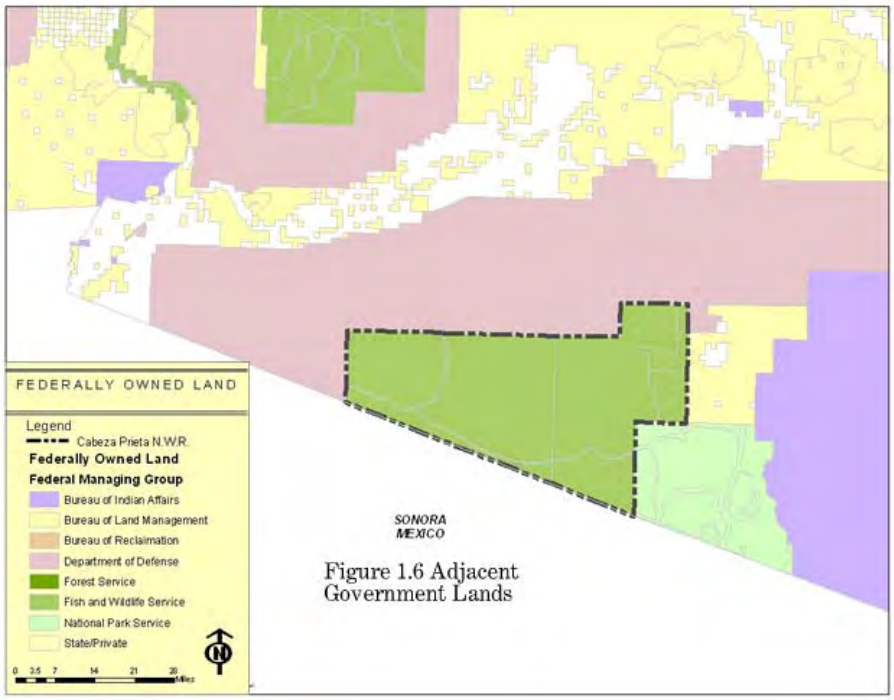


Figure 1.6 Adjacent Government Lands

conserve wildlife, such action may pre-empt State authority. Such decisions have provided a firm basis upon which the Congress and the courts have established the role of the Federal Government as a full partner with the state in the conservation and management of wildlife and the habitats upon it depends. More recently (1999), the Supreme Court decided in favor of the Service in Wyoming v. United States, where the state contended that it had the right to manage wildlife on Federal lands.

1.14.1.3 The Intergovernmental Executive Committee

The 1999 MLWA mandated the formation of an Intergovernmental Executive Committee (IEC) solely for the purpose of exchanging views, information, and advice relating to the management of the natural and cultural resources of the BMGR. The IEC is established by the memorandum of agreement between the secretaries of the Air Force, Navy and Department of the Interior and is comprised of selected representatives from interested federal agencies, as well as at least one elected officer (or other authorized representative) from state government and at least one elected officer or other authorized representative from each local and tribal government.

The IEC convenes three times each year and meetings are advertised to solicit public participation. Meeting locations rotate to maximize opportunity for interested public and local jurisdictional participation. The IEC provides a forum for public groups and private citizens to express their views regarding the management process.

1.14.1.4 Organ Pipe Cactus National Monument

This unit of the National Park System abuts the refuge to the south and east and contains many habitats similar to those on the refuge, although the monument's climate is generally somewhat more mesic (wetter) than that of the refuge. Wide-ranging wildlife species, such as the Sonoran pronghorn, may range between the refuge and OPCNM. The refuge and the monument cooperate with AGFD on Sonoran pronghorn monitoring and share other resource data. The refuge interacts with the monument on several committees, including the IEC and International Sonoran Desert Alliance.

1.14.1.5 Border Law Enforcement

The National MOU established in 2006 specifies appropriate border law enforcement operations on the National Wildlife Refuges. Although the Arizona Wilderness Act provides for continued operations within wilderness, the agencies cooperate to ensure operations do not unnecessarily impact wilderness resources.

The refuge is covered by both the Tucson and Yuma CBP-BP Sectors operating out of Why and Welton stations. The majority of CBP-BP use on the refuge occurs along El Camino del Diablo by the Yuma sector (Welton), which operates "Camp Grip," a temporary command station located in refuge non-wilderness and staffed round the clock. Camp Grip deters illegal travel through a permanent law enforcement presence in the refuge backcountry and facilitates rapid response when illegal cross border travelers are detected. The majority of the Why station's activity occurs on neighboring OPCNM. Daily helicopter patrol occurs along El Camino del Diablo and most vehicle use occurs in response to sensor or rescue activity. Welton provides monthly statistics to refuge management regarding illegal activities occurring on the refuge. Refuge Law Enforcement staff frequently engages in joint operations with DHS Law Enforcement staff.

An increase in CBP-BP coverage at the Ports of Entry and adjacent urban areas along the entire U.S./Mexico border has resulted in additional crossings occurring at more remote locations such as the refuge. In response to great increases in illegal trafficking in remote southwestern locations, the CBP-BP implemented the Arizona Border Control Initiative in 2004. This initiative increases the numbers of border law enforcement agents stationed on and around the refuge and relaxes motor vehicle use constraints previously observed. DEA conduct border operations as well, but has less contact with refuge staff.

1.14.1.6 Bureau of Land Management (BLM)

The refuge participates with the BLM Yuma and Phoenix field offices on regional committees such as the BEC, International Sonoran Desert Alliance, and the Borderlands Management Task Force, and conducts joint law enforcement activities.

1.14.1.7 Tohono O'odham Nation

The refuge participates in a variety of cooperative projects with the Nation including the International Sonoran Desert Alliance, and BEC described elsewhere in this section. Additionally, refuge staff provides technical assistance to Tohono O'odham Nation biologists in developing their natural resource program, assisted in setting up a GIS program, coordinates archeological resource issues, and discusses cultural interpretation development with the Nation.

1.14.1.8 Arizona Interagency Desert Tortoise Team (AIDTT)

The refuge is an important member of the AIDTT due to the large block of tortoise habitat it manages in the southwestern portion of the species' range. The refuge is involved in developing the State Conservation Agreement for the Tortoise.

1.15 NON-GOVERNMENT COOPERATION

1.15.1 International Sonoran Desert Alliance (ISDA)

The ISDA is a community based alliance of individuals, businesses, and organizations of the border region of the western Sonoran Desert area which includes the Cabeza Prieta NWR, OPCNM, Tohono O'odham Nation, the BMGR, the BLM, the Pinacate Biosphere Reserve and the Upper Gulf of California Biosphere Reserve. The organization promotes cooperation between communities, non-governmental organizations, and government agencies in the U.S. and Mexico to resolve resource conflicts, promote community development, and collaborative research activities.

The organization sponsors international border forums each year, has developed a tri-cultural environmental education program called Juntos, and is working to develop a brochure and regional plan for a sustainable economic development strategy.

1.15.2 Cabeza Prieta Natural History Association

The Natural History Association's mission is to promote the scientific, historic, educational, and interpretive activities of the U.S. Fish & Wildlife Service at Cabeza Prieta NWR. They sponsor a winter lecture series and guided tours to Childs Mountain twice a month January through April. The group also coordinates the annual Christmas Bird Count and provides volunteer assistance for a variety of maintenance projects. The group operates sales of books related to the Sonoran Desert, Cabeza Prieta and Sonoran Desert themed tee shirts, mugs, caps and other memorabilia at the refuge visitor center. Proceeds from sales are divided between the Association and the refuge to support visitor services activities and environmental interpretation.

2.0 MANAGEMENT ALTERNATIVES

2. 1 ELEMENTS COMMON TO ALL ALTERNATIVES

Certain elements of endangered and threatened species recovery, wilderness stewardship, and cultural resources management are common to all action alternatives (Alternatives 2 through 5). Some of the alternatives include additional actions beyond those of the common elements. In all such cases the additional actions are described under the appropriate resource area for the individual alternative.

2.1.1 Federal Endangered and Threatened Species

Each of the alternatives will implement the following recovery actions and conservation activities for two federally endangered species documented to occur on the refuge, the Sonoran pronghorn and the lesser long-nosed bat. One other federally listed species, Pierson's milkvetch, may occur on the refuge, but has not been documented.

2.1.1.1 Sonoran Pronghorn

The refuge is a leader in the overall Sonoran pronghorn recovery effort. The refuge biologist is the recovery coordinator, and refuge staff is represented in all recovery team meetings. The refuge biologist is often elected as the recovery team leader. The refuge will continue to implement Sonoran Pronghorn Recovery Plan actions. The *Recovery Criteria and Estimates of Time for Recovery Actions for the Sonoran Pronghorn, a Supplement and Amendment to the 1998 Final Revised Sonoran Pronghorn Recovery Plan* established eight recovery efforts that should initially result in down-listing the species to federal threatened status (an estimated 300 adult Sonoran pronghorn in one U.S. population and a second separate population established in the U.S.). The recovery efforts should contribute to the eventual recovery of the species and its removal from endangered or threatened status (USFWS 2002). The amendment further states:

> In the near-term, recovery efforts should focus on: 1) improving habitat for fawn survival and recruitment through the establishment and evaluation of forage enhancement plots on the BMGR (USAF 2000); 2) initiating a quantitative evaluation of pronghorn use and reliance on sources of free water (temporary and permanent); 3) reducing predation through the selective removal of coyotes from specific areas and at times of the year when adult female pronghorn are most susceptible to predation (the need for coyote control will vary from year-to-year based on environmental conditions); 4) evaluating potential transplant locations, establishing relocation methodology and protocols, developing interagency agreements (including with Mexico as required), acquiring funding, and initiating reestablishment projects; 5) increasing frequency and expanding scope of aerial monitoring in Mexico to improve comparability with U. S. surveys; 6) investigating potential pronghorn disease vectors; 7) reducing disturbance at critical times of the year; and 8) investigating and reducing movement barriers. The Service will annually review implementation of the Recovery Plan to determine when revisions are appropriate, including the appropriateness of establishing delisting criteria (USFWS 2002).

Helicopter crew releasing a radio collared pronghorn

USFWS Photo

The refuge's management actions for Sonoran pronghorn currently address all of the eight recovery actions listed above with the exception of numbers 3) reducing predation through coyote control, 5) increasing monitoring in Mexico, and 6) investigating potential disease vectors.

2.1.1.1.1 Population Monitoring

The refuge and AGFD conduct range wide population surveys of the U.S. Sonoran pronghorn sub-population every two years, using a group sighting model. The monitoring protocol sets a target of keeping radio collars on approximately 10 percent of the population. In the summer and fall of 2002 all remaining individuals with operating collars died. Additional capture and collar operations are undertaken when permits are obtained and weather conditions allow safe capture and collaring. During the winter of 2005 two Sonoran pronghorn were captured and collared. These are the only collared individuals currently within the U.S. population. The refuge and AGFD have developed protocols for capture and collar operations to prevent capture myopathy related mortality (that is, post-capture death of animals related to shock and stress of capture and handling; in the past capture myopathy resulted in high levels of mortality after collaring operations) to pronghorn.

AGFD also conducts weekly aerial radio tacking of collared pronghorn with visual reconnaissance for uncollared individuals. Whenever possible, mortalities are investigated and forensic investigations conducted promptly. AGFD and the refuge maintain a database of all Sonoran pronghorn sightings.

A summary of population data from the period 1992 through 2004 is presented in Table 2.1.

Table 2.1: Sonoran Pronghorn Population Estimates, 1992-2004

Date	Pronghorn seen on transects	Total number of pronghorn seen	Population estimate	95 % Confidence interval
Dec. 1992	99	121	179	145-234
Mar. 1994	100	109	282	205-489
Dec. 1996	71	95	130	114-154
Dec. 1998	74	98	142	125-167
Dec. 2000	67	69	99	69-392
Dec. 2002	18	18	21	18-35
Dec. 2004	39	39	58	40-175

2.1.1.1.2 Developed Waters

Jose Juan Charco with water

USFWS Photo

Five types of water developments are found on the refuge: buried reservoirs with collection points and drinking troughs, runoff tanks (modified tinajas), charcos, wells with drinking troughs, and storage tanks with drinking troughs. Buried reservoirs are typically constructed of one or more 1,780-liter (470-gallon) pipes connected to water collection points in natural drainage courses and wildlife drinking troughs. Buried tanks are covered with native soil and have very little visual impact on the surroundings. Runoff tanks mimic natural tinajas and are the next most natural looking structures. They are created by either blasting holes in rock or building small dams in mountain washes. A few hold water throughout the season. Charcos are dugout ponds also locally called repressos. An area is bulldozed and lined to hold water. The charcos dry up during the driest time of year. Fiberglass tanks and drinkers were added to charcos and other sites to augment water in dry months. These structures include a water reservoir of some type connected to a drinker, or trough regulated by a float valve, and require hauling water once or twice each year. Most of the wells are located outside of wilderness. They were developed for livestock when grazing was permitted and now feed drinkers for wildlife. Most are

Papago Well and water storage tank

USFWS Photo

located in pronghorn habitat, but levels of use by pronghorn are poorly understood, although refuge photography by motion triggered cameras verifies use of several developed waters by Sonoran pronghorn..

There are 22 developed waters on the refuge in Sonoran pronghorn habitat. See Table 2.2 for a listing of these water, their general type, location relative to the refuge wilderness, and type of activity related to managing the water.

A determination to haul water is based upon observation of water levels by AGFD personnel during weekly aerial reconnaissance, observations by refuge staff conducting field

Table 2.2 Developed Water in Sonoran Pronghorn Habitat

Name	Type	Wilderness	Current Activity
Adobe	Well, tank & trough	No	Monitoring , maintenance, some water hauling
Adobe House	Well, tank & trough	No	Recently redeveloped, monitoring & maintenance
Antelope	Improved water	Yes	Monitoring, maintenance, emergency water hauling only
Bassarisc*	Improved water	Yes	Monitoring, maintenance, emergency water hauling only
Charlie Bell*	Well, tank & trough	Yes	Monitoring & maintenance
Chico Shunie	Well, tank & trough	No	Not functioning
Jacks	Well, tank & trough	Yes	Monitoring & maintenance, hauling, redevelopment proposed
Jose Juan	Charco, tank & trough	Yes	Monitoring, maintenance, water hauling
Little Tule	Well, tank & trough	No	Monitoring, maintenance, hauling, redevelopment proposed
Lower	Well, irrigation	No	Recently redeveloped
Papago	Well, tank & trough	No	Monitoring, maintenance & hauling
Redtail	Charco, tank & trough	Yes	Monitoring, maintenance & hauling
Tiller	Well, tank & trough	No	Monitoring & maintenance
9 emergency waters	Improved waters, some have limited capacity	Yes	Monitoring, maintenance & hauling enlargement and improvements proposed.

* These waters are used bighorn sheep was well as Sonoran pronghorn. In the case of Basserisc, only very infrequent use by Sonoran pronghorn is known to occur

work near the waters, and best judgment of refuge staff considering precipitation and temperature. The refuge attempts to prevent developed waters from going dry during the hot summer season, while also avoiding unnecessarily frequent water hauling trips. Water is hauled in a 5,675 liter (1,500 gallon) capacity heavy duty truck. Typically nine to eighteen water hauling trips are made in each year. Refuge staff prepares a Minimum Requirements Analysis (MRA) (see Section 2.1.3.1 below for a discussion of MRA) prior to any hauling and records miles driven in wilderness.

In the spring of 2003, the refuge, with assistance from its partners, installed an improved water collection and storage system at Antelope Tank. The new system uses an underground storage tank of approximately 46,500 liters (11,000 gallons), multiple water collection points in washes, and a small drinking trough. This system has low visual impact, high water collection efficiency, and low evaporation potential and requires little maintenance. The system's design is expected to significantly lower required water hauling and scheduled maintenance, as compared to the parabolic tank it replaces. Experience since this improvement's installation suggests that water hauling will only be necessary in times of prolonged, extreme drought, In over two and one-half years since its installation, including a period of prolonged drought in the fall and winter of 2005 and 2006, no hauling of supplemental water has been required (Coffeen, pers. com. 2006).

Volunteer work crew installing buried reservior system at Antelope Tank USFWS Photo

Refuge staff and volunteers installed an improved water storage and collection system of similar design to that used at Antelope Tank, as well as a drinking trough in Sonoran pronghorn habitat, at Bassarisc Tank in early 2004. The new buried tanks at Bassarisc Tank have a capacity of 37,360 liters (9,870 gallons) and are connected to multiple water collection points in natural drainages. This improved water Bassarisc Tank is not anticipated to require supplemental water other than during periods of prolonged, extreme drought.

During the summers of 2001 and 2002, the refuge conducted water source monitoring and experimental placement of temporary developed waters in Sonoran pronghorn habitat. Temporary waters were placed south of Charlie Bell Road in Daniels Arroyo, and at two locations on the bajada of the Agua Dulce Mountains. This experiment verified that Sonoran pronghorn would use new sources of water in previously unwatered areas and also provided quantitative data on pronghorn use of temporary waters, as targeted by the second recovery effort.

In response to the results of the temporary waters experiment, the refuge has developed 10 emergency waters in Sonoran pronghorn habitat since 2003. These waters are similar to the improvements for Bassarisc and Antelope Tanks described above, except that they are of smaller capacity, ranging from 1,780 liters (470 gallons) to 3,560 liters (940 gallons). These ten emergency waters are located in wilderness (including one located on OPCNM). Figure 2.1 shows the locations of refuge developed waters.

2.1.1.1.3 Captive Breeding/Translocation

The refuge biologist, in consultation with AGFD biologists, prepared a white paper overview of Sonoran pronghorn reestablishment standards for the Canada/ Mexico/U.S. Trilateral Committee for Wildlife and Ecosystem Conservation and Management (Morgart *et al,* 2002). This paper summarizes potential alternatives of translocation and/ or captive breeding of Sonoran pronghorn to increase the viability of existing subpopulations in the U.S. and Mexico, or establish a new subpopulation in either country in the interest of species recovery. The paper concludes: "Re-establishment of Sonoran pronghorn into suitable habitat in the Sonoran Desert of southwest Arizona and northwest Sonora, Mexico, is a necessary action in order to affect a meaningful recovery of the subspecies." (Morgart *et al.* 2002).

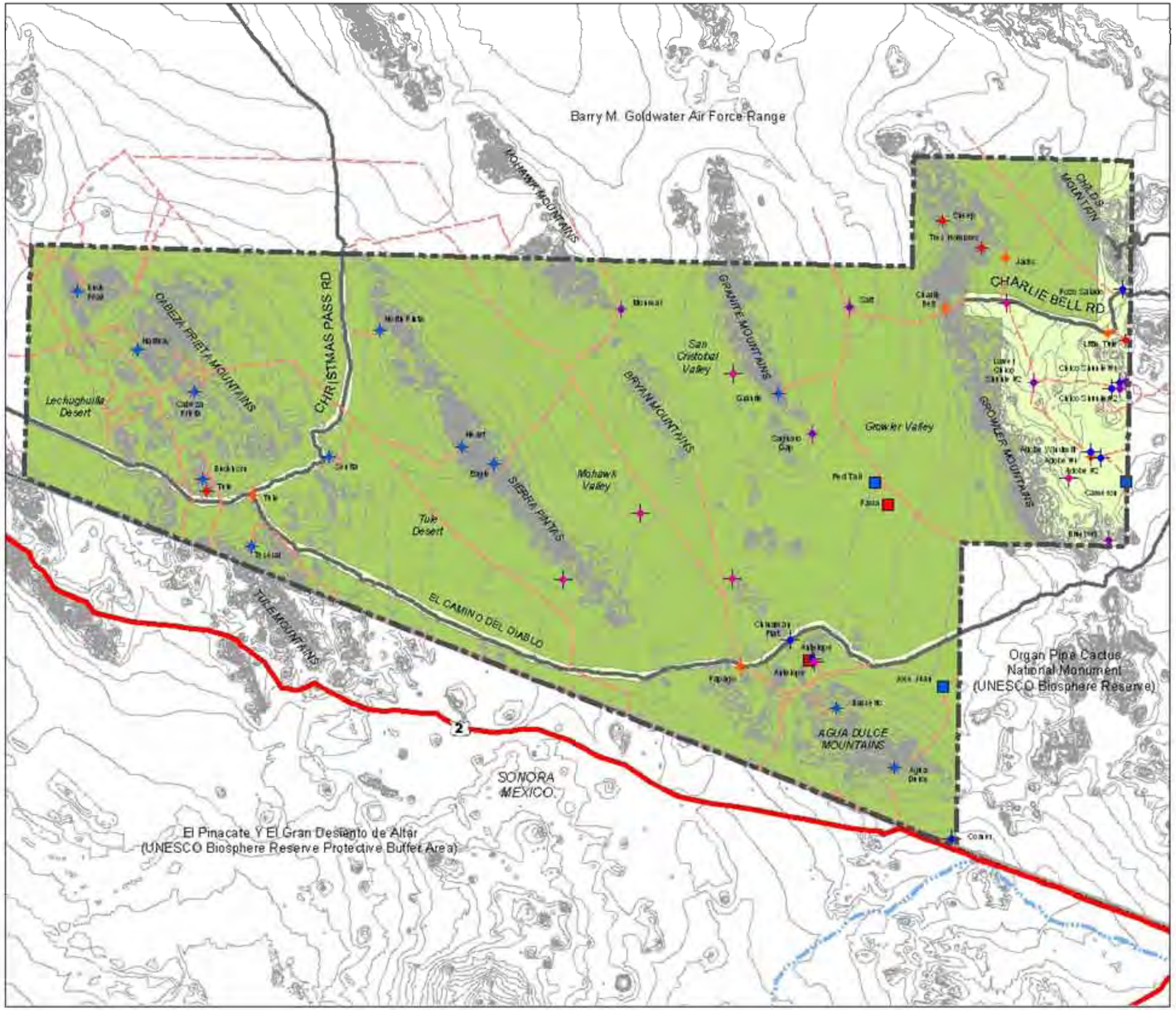


Figure 2.1 Developed Waters

Legend

- Cabeza Prieta N.W.R.
- Wilderness
- Non-Wilderness
- Public Roads
- Administrative Trails
- US/Mexico Border
- Highway
- Rio Sonoyta
- Active Well
- Active Tinaja / Tank
- Inactive Tinaja / Tank
- Inactive Well
- Capped Well
- Active Charco
- Inactive Charco
- Waters for Sonoran Pronghorns

Sources: USFWS, 2003

0 1.5 3 6 9 12 Miles

N

CABEZA PRIETA
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE

In the winter of 2003, the refuge developed a semi-captive breeding facility south of Charlie Bell Road. The facility occupies approximately 260 hectares (640 acres) enclosed by a fence adequate to contain Sonoran pronghorn and exclude predators. A source of drinking water for pronghorn and several irrigated areas (irrigation simulates rainfall during a wetter than average year) supply sustenance for the pronghorn inside the enclosure. After the fence was installed, predators were aggressively removed from the enclosure. During the winter of 2004-2005 refuge and AGFD staff captured Sonoran pronghorn in Mexico and on the refuge to stock the semi-captive breeding facility. One animal captured during the 2005 operation was observed eating alfalfa hay used as bedding material. During the winter of 2005-2006 refuge staff provided Sonoran pronghorn in the semi-captive breeding facility alfalfa hay as an experimental food supplement. The animals accepted alfalfa as fodder. In the spring of 2006 there were 18 adult Sonoran pronghorn in the facility, 12 does, 2 breeding bucks and 4 yearling bucks that are considered surplus animals and will be released into the refuge when weather conditions are favorable. By providing ample food and water resources in an environment of reduced predation, the semi-captive breeding facility is anticipated to stimulate rapid regrowth of the refuge Sonoran pronghorn population (Coffeen, pers. comm.).

2.1.1.1.4 Area Closures

Recent biological opinions issued by the Service to the managers of adjacent public lands required the closure of Sonoran pronghorn habitat to public recreational access on lands administered by the BMGR and OPCNM during the fawning season (March 15 through July 15). The refuge, although not included in the mandatory closure, voluntarily closed public access to approximately the eastern three-quarters of its area, roughly from 8 kilometers (5 miles) east of Tule Well to the refuge eastern boundary, since 2002. Similar annual closures are likely until drought conditions ease and/or the U.S. Sonoran pronghorn subpopulation is considered stable. All action alternatives will include closure of this area during the fawning season until Sonoran pronghorn numbers have increased substantially.

2.1.1.1.5 Supplemental Feeding and Forage Enhancements

During the summer and fall of 2002, greater than normal mortality of radio-collared Sonoran pronghorns was observed on the refuge. During the December 2002 biennial Sonoran pronghorn survey conducted by AGFD and the Service, only 18 animals were observed. The 95 percent confidence interval estimate of the population size was 18 to 35 and the population estimate was 21. This is the lowest estimate ever observed. Such low population size is likely due to extreme drought resulting in poor forage conditions and high mortality (J. Morgart, USFWS, pers. comm.).

As an emergency response, the refuge provided mineral licks and supplemental feed, both pellets of a composition used to feed American pronghorn at zoos and grass hay, at sites of known pronghorn use. These measures were considered experimental, short-term efforts to address an acute need. No evidence was collected that Sonoran pronghorn recognized the feed pellets or hay as potential food sources. One remote camera recorded a single incidence of an individual pronghorn examining feed pellets, but none have been recorded eating the pellets. It appears that wild Sonoran pronghorn, unfamiliar with supplied feed, will not accept it. Sonoran pronghorns in the semi-captive breeding facility have accepted alfalfa hay as a supplemental fodder, and it is also being considered as a supplemental forage at the forage enhancement plots during extreme drought periods.

The Sonoran Pronghorn Recovery Team has proposed to develop forage enhancement areas on the refuge, BLM lands, and others in the BMGR to provide sources of green fodder to Sonoran pronghorn during times of drought stress on vegetation. Forage enhancements are areas of approximately 10 hectares (25 acres), selected on sites having greater than average vegetative cover in areas of documented frequent pronghorn presence. Approximately 2.4 hectares (6 acres) within the enhancement is then rigged for sprinkler irrigation. The site is irrigated during low rainfall years to mimic natural rainfall during a slightly wetter than average year. No

supplemental seeds are planted, as the ground should have adequate seed resources and off-site seed sources may be contaminated with exotic species Currently six forage enhancement areas for Sonoran pronghorn exist on or near the refuge. One forage enhancement was developed in the semi-captive breeding enclosure to provide supplemental food sources for the animals contained within the enclosure. There are five additional forage enhancements in Sonoran pronghorn habitat, two within the BMGR to the north of the refuge, and three in Childs Valley on the refuge. The three refuge forage enhancement plots are all located in non-wilderness and are supplied with water from Tiller Well, Adobe House Well and Lower Well. If the Sonoran Pronghorn Recovery Team recommends development of additional forage enhancements on the refuge, the refuge will develop them, upon obtaining all necessary approvals.

2.1.1.1.6 Fencing

The refuge, with assistance from volunteer organizations, is in the process of removing barriers to pronghorn movement. Existing boundary fence separating refuge lands from adjacent lands subject to grazing is being modified to be cattle proof but pronghorn passable (lowest strand not barbed and at least 46 centimeters [18 inches] above grade). Subject to the BLM's current Biological Opinion for five livestock grazing allotments in the vicinity of Ajo, Arizona, fences between the refuge and BLM lands to the east will be laid down between May 1 and August 31 of each year to facilitate Sonoran pronghorn passage. Grazing has been abandoned on one allotment, resulting in complete removal of fencing from the Little Ajo Mountains. Fencing within the refuge and fencing between the refuge and OPCNM has been taken down, and the fencing materials removed by volunteers, refuge staff and OPCNM staff, subject to MRA.

2.1.1.2 Lesser Long-nosed Bat Conservation

Fence around entrance to lesser long-nosed bat maternity roost
Photo by Curtis McCasland

The federally endangered lesser long-nosed bat's maternity roost known to exist on the refuge will continue to be afforded legal protection by virtue of the Refuge's protected status and limited access. Despite this level of legal protection, however, the roost has been subject to frequent unauthorized use by migrants and smugglers. In the early spring of 2004, the refuge installed a steel fence ranging from 2.5 to 3 meters (8 to 10 feet) high around the roost entrance to discourage human entry. The fence is constructed of 2.5-centimeter (1-inch) vertical pipes welded to cross pipes at 13-centimeter (5 -inch) intervals. The tops of the vertical pipes are cut at an angle to produce a sharp point and the top 30 centimeters (12 inches) of the pipe is bent outwards. The sharp tops and outward bend should make climbing over the fence difficult. This fence provided an immediate positive effect to bats that were displaced by human interference. After observing no bat use of the cave in the summer of 2003, refuge biologists documented use by more than 2000 bats in 2004, and a return to pre-disturbance levels in 2005. Refuge staff periodically monitors the entrance to the roost to document damage caused by unauthorized human use and assess bat use. Refuge law enforcement personnel conduct periodic surveillance of the roost to check for persons using the entrance as a campsite, storage area or shelter. Refuge biologists will continue to survey for additional, unknown roost sites on the refuge. The refuge will continue to keep the location of the roost unpublished. Survey and surveillance activities are conducted on foot in wilderness.

2.1.1.3 Pierson's Milkvetch Surveys

The federally threatened Pierson's milkvetch occurs on Marine Corps (USMC) lands to the west, but has not been documented on the refuge. The Pinta Sands, in the south central area of the refuge, provide potential habitat for Pierson's milkvetch. Refuge staff will continue to conduct periodic surveys for this threatened plant in suitable habitat.

2.1.1.4 Desert Pupfish Refugium

Action Item 11 of Objective 3 of the *Gila/Salt/Verde Ecosystem Plan* (USFWS 1994) calls for investigating the feasibility of establishing secondary populations of desert pupfish on refuge lands. This endangered fish is not known to have ever occurred on the refuge, but is a component of the Sonoran Desert biota. During the summer of 2004 the refuge developed a refugium on the visitor center site. Refuge staff will continue to monitor the refugium population and provide interpretive services for refuge visitors.

2.1.2 Species of Conservation of Concern

2.1.2.1 Cactus Ferruginous Pygmy-owl Monitoring

The refuge continues to take an interest in the formerly federally endangered cactus ferruginous pygmy-owl. Although only two records of the owl exist on the refuge, there is potential habitat on the refuge. Refuge staff will continue to monitor the presence and number (if present) of owls.

2.1.2.2 Desert Bighorn Sheep Population Monitoring

The refuge and AGFD conduct helicopter surveys to monitor sheep populations every three years. These surveys began in 1986. Population estimates are extrapolated from survey results using a correction factor for group size, sex and age structure, and percent of habitat surveyed to determine a population estimate from the number of sheep observed (see Table 2.3 for a summary of survey estimates). The refuge maintains a database of population statistics, including group size, sex and age structure, and percent of habitat surveyed.

Table 2.3: Population estimates from Cabeza Prieta Desert Bighorn Sheep Surveys, 1993-2005

Date	Population Estimate	95 Percent Confidence Interval
1993	480	334-958
1996	408	285-801
1999	381	271-718
2002	323	228 -621
2005	348	248-663

2.1.3 Wilderness Stewardship

The Arizona Desert Wilderness Act of 1990 designated 325,133 hectares (803,418 acres) of the 348,035-hectare (860,010-acre) refuge, or 93 percent of the refuge area, as Federal Wilderness. This wilderness is administered in compliance with the Wilderness Act of 1964, with the exception that the Arizona Desert Wilderness Act of 1990 included provisions to allow some generally prohibited uses in order to facilitate border law enforcement and military training activities. Refuge management and operations will strive to protect the character of the designated wilderness, so that it meets the definition found in the Wilderness Act of 1964:

> A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological or other features of scientific, educational, scenic or historical value. (Sec. 2 (c)).

2.1.3.1 Minimum Requirements Analysis

The Wilderness Act of 1964 lists uses that are generally prohibited within designated wilderness unless the use is necessary to meet the minimum requirements for administration of the area as wilderness. These generally prohibited uses are: any temporary road, use of motor vehicles, motorized equipment or motor boats, landing of aircraft, any other form of mechanical transport or any structure or installation (Sec. 4 (c)). Any refuge management activity proposing one or more of the generally prohibited uses within the refuge wilderness will be subject to MRA to determine appropriateness, on either a programmatic or case-by-case basis. In addition to such uses, which are generally prohibited, but may be allowed as the minimum requirement to administer the area as wilderness, the Wilderness Act of 1964 also prohibits two uses in wilderness unconditionally. Commercial enterprises and permanent roads are prohibited in wilderness, unless specifically provided for in the Act or subsequent wilderness establishment legislation (Sec. 4 (c)).

The MRA is a two-step process. First, the proposed use must be demonstrated to be necessary for administration of the area as wilderness. Second, the means of accomplishing the proposed use must be analyzed and alternatives investigated to determine that the necessary use is being executed in a manner that minimizes impacts to wilderness character, both long- and short-term. Only when both of these conditions have been satisfied can the use be considered “necessary to meet the minimum requirements for the administration of the area” and be allowed within wilderness.

Although the intensities of management activity and means of wilderness access will vary among the alternatives, only activities determined necessary to administer the refuge as a wilderness or those specifically exempted under the Arizona Desert Wilderness Act, such as border enforcement, will be allowed within designated wilderness. Activities necessary to administer the area as a wilderness include wildlife management practices determined necessary to foster or maintain appropriate densities of native wildlife.

2.1.3.2 Border Law Enforcement

The Arizona Desert Wilderness Act of 1990 specifically states that designation of wilderness lands within the refuge will not preclude or otherwise affect continued border operations by the Immigration and Naturalization Service, the Drug Enforcement Administration (DEA) or the United States Customs Service, in accordance with interagency agreements (Title III, Sec. 301 (g)). Earlier interagency agreements between federal border law enforcement agencies and the Service limited routine patrol vehicle use to public roads; and allowed use of refuge administrative trails only to investigate sensor activity, engage in pursuit activity, and search and rescue operations; and limit off-road travel to emergency situations. The national MOU enacted in March of 2006 among DHS and bureaus of the Departments of Agriculture and the Interior that manage lands authorizes use of vehicles for border law enforcement activities on administrative trails closed to the general public. Such use on the refuge is consistent with the Arizona Desert Wilderness Act of 1990, as the density of illegal travelers and the size of the refuge renders use of administrative trails necessary effect border law enforcement.

In recent years undocumented alien (UDA) traffic in and around the refuge has increased significantly, apparently in response to increased law enforcement in urban areas. In the response to this increase, the CBP-BP is implementing the Arizona Border Control Initiative. This effort will increase the number of border law enforcement personnel and equipment along the international boundary in Arizona and may result in some relaxation of vehicle use restrictions on border law enforcement personnel in wilderness areas.

The refuge presents training and orientation sessions for CBP-BP and DEA agents to increase their awareness of appropriate operations in wilderness, and is assisting CBP-BP in preparation of a training video that provides guidelines on low impact wilderness travel techniques.

Refuge law enforcement staff participates in the Border Anti-Narcotics Network (BANN), a combined effort among local and federal law enforcement agencies (Pima County Sheriff's Office, CBP, Immigration and Naturalization Service, DEA, BLM, NPS and Military) to combat narcotics trafficking. Refuge staff also participates with CBP-BP in apprehending undocumented aliens on the refuge. The refuge and CBP-BP deploy and monitor a network of remotely operated sensors to detect vehicles and pedestrians moving in proximity to the border. This remote sensing includes magnetometers, automated cameras and motion detectors.

The refuge maintains bilingual (English-Spanish) warning signs along the border. These signs warn that crossing the desert is dangerous due to hazards of heat and dry conditions. In addition to bilingual written warnings, the signs include easily understood icons depicting the dangers of heat and desiccation. The signs are often stolen or removed by unknown individuals (permitted refuge visitors are not allowed on the border) and refuge staff cannot keep up with replacement.

DHS is currently developing plans for a border vehicle barrier. Other solutions, including a human- and vehicle-proof fence along the entire U.S./Mexico border are being considered in U. S. Congress. Prior to the Department of Homeland Security's proposal to develop a border vehicle barrier, the refuge had proposed developing a similar structure. Upon review, the Office of Management and Budget (OMB) determined that the potential cost of a vehicle barrier would be too high to be borne by the National Wildlife Refuge System. Furthermore, OMB stated that it was not the job of the Department of the Interior to secure an international border. The exact location and design of the Department of Homeland Security's vehicle barrier has not yet been determined. The barrier would require regular patrols to detect efforts to circumvent the barrier such as placement of vehicle ramps over the barrier. All environmental and NEPA clearances for construction and operation of the vehicle barrier will be obtained by the U.S. Department of Homeland Security when actual construction is proposed. The refuge and the Service will review and comment upon any structures proposed to be constructed along the border in the vicinity of the refuge.

2.1.3.3 Wilderness Impact Monitoring

In 1999, the refuge initiated a program of annually surveying 25 designated monitoring areas for impacts to wilderness. The monitoring areas are 9.1 meters by 10.7 meters (30 feet by 35 feet) in area and are located along all public use roads and along 10 administrative trails. Each area was evaluated for percent bare soil, percent slope, trail depth, evidence of vehicle use beyond the limits of the road or administrative trail, washouts, vegetation cover, vegetation damage, root exposure, cleanliness, and evidence of wildlife. Control plots are also established nearby to monitor natural conditions as compared to changes occurring due to vehicle and other road/administrative trail impacts. In addition, a campsite monitoring program has been initiated to record the number, size, location, and condition of campsites on the refuge. Owing to reduced staff levels and funding, as well as increased demands brought on by border problems, the refuge has been unable to consistently monitor these impacts in recent years.

2.1.4 Cultural Resources Management

All management activities on the refuge will be in compliance with Section 106 of the National Historic Preservation Act. Prior to any projects requiring earth moving, an archaeological review will be completed to ensure that cultural resources are not affected. Unauthorized excavation or disturbance of cultural or historical artifacts is prohibited. The location of known cultural artifacts on the refuge is not published or otherwise publicly disclosed. The only interpretation of cultural artifacts at the refuge occurs at the visitor center. The *Cultural Resources Overview and Assessment, Cabeza Prieta National Wildlife Refuge,* prepared under contract to the Service in 2001, contains information on prehistoric cultures that occupied or traveled through the lands that became the refuge, and records known cultural resources. The refuge also hosts annual surveys by Archaeological Site Stewards, a group of volunteers recognized by the State of Arizona for their archaeological training. The locations of all archaeological sites identified are recorded by the refuge, but are not made public to avoid attracting pot hunters.

Water jar

USFWS Photo

2.1.5 Research

2.1.5.1 Biological Research

As a result of serious budget cuts in Fiscal Year 2006 and further cuts proposed for FY 2007, the refuge is not funding any biological research other than research related to Sonoran pronghorn recovery.

2.1.5.1.1 Sonoran Pronghorn

The refuge implements research goals of the Sonoran pronghorn recovery effort, and also invites research by other pronghorn experts. The refuge cooperates with outside researchers investigating Sonoran pronghorn/ water relationships, and the effect of developed waters on other wildlife populations, including predators and non-native species.

A University of Arizona research project investigating the behavior of Sonoran pronghorn in the breeding enclosure was initiated in 2004. In 2006, funds to complete the last year of the study were cut because of a midterm budget cut and only limited data collection was funded by University of Arizona.

The refuge, in cooperation with AGFD and funded by USAF, conducted studies of Sonoran pronghorn's responses to nighttime aerial training missions over the refuge and BMGR, using mule deer as a surrogate species.

2.1.5.1.2 Desert Bighorn Sheep

A University of Arizona research project investigating desert bighorn sheep water preference was initiated in 2001. This study uses radio collars with global positioning system satellite uplink capability to establish a baseline of sheep movements in the Sierra Pintas and then monitor response when sheep access to the three primary water sources in that range (North Pinta Tank, Heart Tank and Eagle Tank) is experimentally denied (i.e., the waters will be fenced to exclude any use by sheep). The 5-year study should be of sufficient length to capture responses to some of the climatic variation typical of the Sonoran Desert. In 2006, funds to complete the last year of this PhD research study were cut and only limited data were collected the last year.

2.1.5.1.3 Other Species

Refuge staff and resources are available as feasible to researchers investigating any of the threatened or endangered species known or believed to occur on the refuge.

The refuge encourages academic research on its reptiles and amphibians. The University of Arizona is developing a recommended survey protocol for reptiles and amphibians. The refuge plans to adopt this protocol.

The refuge will invite academic and other researchers to conduct rodent monitoring on the refuge.

2.1.5.1.4 Ecological Integrity

The refuge supports any academic or other research investigating ecosystem integrity of the Sonoran Desert, both in the U.S. and Mexico.

2.1.6.1.5 Exotic and Invasive Species

The refuge and the Service Regional Office staff seek methods to control and/or prevent infestations of exotic or invasive species. The refuge will support academic research regarding control of such species on the refuge.

2.1.5.2 Wilderness

The refuge analyzes the data gathered in all wilderness monitoring efforts, both current and proposed. This data analysis is aimed at identifying the type and magnitude of impacts to wilderness character caused by refuge management activities, illegal cross border traffic, border law enforcement and military activities. See the individual alternative descriptions for the details regarding ongoing or proposed wilderness monitoring. The refuge also welcomes wilderness research proposals by academic and other researchers.

2.1.5.3 Visitor Services

The refuge will analyze visitor survey data collected in 2002 to identify trends in preferred visitor experiences, factors that adversely affect the visitor experience, and other trends.

2.1.5.4 Cultural Resources

The refuge will continue to consult with the Tohono O'odham Nation, the Hia-Ced O'odham and Yuman/Patayan nations, when considering requests by academic and other researchers to conduct archeological surveys of the refuge. Archaeological Site Stewards will continue to consult with the refuge and conduct period site investigations for cultural resources.

2.2 ALTERNATIVE 1: NO ACTION ALTERNATIVE (CURRENT MANAGEMENT)

This alternative describes the current management activities at the refuge. These programs and activities would continue if none of the action alternatives (Alternatives 2 through 5) were adopted. Management activities are focused on recovery of the endangered Sonoran pronghorn, maintaining the populations of desert bighorn sheep, monitoring nongame wildlife species, monitoring and controlling invasive species, protecting wilderness character, and providing visitors with quality wildlife-dependent recreational experiences that are compatible with the refuge purposes.

2.2.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance, and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.2.1.1 Endangered and Threatened Species

2.2.1.1.1 Sonoran Pronghorn

2.2.1.1.1.1 Population Monitoring

No change from that described above in Section 2.1.1.1.1, Elements Common to all Alternatives.

2.2.1.1.1.2 Developed Waters

No change from that described above in Section 2.1.1.1.2, Elements Common to all Alternatives.

2.2.1.1.1.3 Captive Breeding/Translocation

No change from that described above in Section 2.1.1.1.3, Elements Common to all Alternatives.

2.2.1.1.1.4 Area Closures

No change from that described above in Section 2.1.1.1.4, Elements Common to all Alternatives.

2.2.1.1.1.5 Supplemental Feeding and Forage Enhancements

No change from that described above in Section 2.1.1.1.5, Elements Common to all Alternatives.

2.2.1.1.1.6 Fencing

No change from that described above in Section 2.1.1.1.6, Elements Common to all Alternatives.

2.2.1.1.1.7 Predator Management

None.

2.2.1.1.1.8 Habitat Restoration Research

Other than research on use of developed waters and supplemental food sources by Sonoran pronghorn, none is ongoing.

2.2.1.1.2 Lesser Long-nosed Bat Conservation

No change from that described above in Section 2.1.1.2, Elements Common to all Alternatives.

2.2.1.1.3 Pierson's Milkvetch Surveys

No change from that described above in Section 2.1.1.4, Elements Common to all Alternatives.

2.2.1.1.4 Desert Pupfish Refugium

No change from that described above in Section 2.1.1.5, Elements Common to all Alternatives.

2.2.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.2.1.2.1 Developed Waters

There are currently 15 developed waters located within desert bighorn sheep habitat on the refuge (see map, figure 2.2). Two of these, Charlie Bell Well and Bassarisc Tank, also serve Sonoran pronghorn. The refuge periodically hauls supplemental water to Buck Peak, Halfway, Tuseral, Bassarisc, North Pinta, Granite, Heart and Eagle Tanks, all located within the wilderness, as well as the Childs Mountain Parabolic Tank, in non-wilderness. Refuge staff hauls waters to these tanks once or twice annually during normal years, with more hauling during drought years. Hauling to North Pinta, Heart and Eagle Tanks ceased for the duration of the experiment described above in Section 2.1.5.1.2. As in the case for the pronghorn waters, a determination to haul water is based upon observation of water levels by AGFD personnel during weekly aerial reconnaissance, observations by refuge staff conducting field work near the waters, and best judgment of refuge staff considering precipitation and temperature. The refuge attempts to prevent developed waters from going dry during the hot summer season, while also avoiding unnecessarily frequent water hauling trips. Water is normally hauled in a 5,675 liter (1,500 gallon) capacity heavy duty truck, although a helicopter was used to haul water to Heart and Eagle Tanks during the unusually dry summer of 2002. The refuge has installed measures to limit evaporation at the waters, consistent with minimum requirement analyses for waters in wilderness. The most commonly used measures are simple shade structures and mats that float on the water surface. The refuge has relied upon the results of a literature search conducted by AGFD, as well as established wildlife management practices, as a basis for the developed waters program in desert bighorn sheep habitat.

2.2.1.2.2 Forage Enhancements

None.

2.2.1.2.3 Population Goal

The refuge has never established a numerical goal for the population of desert bighorn sheep, but rather manages for a healthy, breeding population of unstated size. Although comparing population estimates from earlier times with recent estimates can be misleading due to differing population survey protocols having been used, recent population estimates for the refuge (348 in 2005) are considerably higher than those of the middle of the twentieth century (50 to 100 in 1939) when the population was heavily exploited.

2.2.1.2.4 Predator Management

None.

2.2.1.3 Desert Ecosystem Integrity Monitoring

2.2.1.3.1 Cactus Ferruginous Pygmy-owl

The refuge will continue to survey for the presence of Cactus Ferruginous Pygmy-owl, as described above in Section 2.1.2.1, Elements common to All Alternatives.

2.2.1.3.2 Migratory Birds

The refuge staff monitors Le Conte's thrasher nests for reproductive success, renesting attempts and nest site characteristics. Le Conte's thrasher is listed by the Arizona Partners in Flight program as an indicator of Sonoran Desert health. All monitoring for Le Conte's thrasher in wilderness is conducted on foot from vehicles using the non-wilderness public access corridors.

2.2.1.3.3 Reptiles and Amphibians

The refuge will continue to survey abundance, distribution and breeding potential of amphibians, especially in developed waters.

2.2.1.3.4 Raptors and Ravens

No monitoring currently occurs.

2.2.1.3.5 Game Animals

There is no formal monitoring or management program for game species other than desert bighorn sheep.

2.2.1.3.6 Long-Term Monitoring

The refuge formerly operated eight meteorological instruments that recorded precipitation, temperature, and humidity. This equipment has become nonfunctional and cannot be used until funds are acquired for its repair. The refuge also established vegetation transects in 2002 for repeat monitoring to detect changes in the refuge plant community.

2.2.1.3.7 Exotic/Invasive Species

The *Checklist of the Plants of Cabeza Prieta National Wildlife Refuge, Arizona* lists 32 non-native plant species that occur on the refuge (Felger 1998). This list is presented in Appendix E. Three non-native species: fountain grass, buffelgrass and Sahara mustard, have become established at infestation levels on the refuge. These species have the potential to out-compete native species for resources and reduce the density of native flora on the refuge. Sahara mustard is of particular concern as it appears to be infesting the Pinta Sands area, which has supported a native sand dune endemic community considered to be an important food source for Sonoran pronghorn. In consultation with the regional Exotic/Invasive Species Coordinator, the refuge has modeled likely locations of occurrence for each species. Refuge staff has been trained to recognize these species and document any occurrences encountered during fieldwork. The refuge controls small infestations of fountain grass and buffelgrass by hand pulling to prevent the spread of infestation.

Trespass livestock present a variety of potential problems to native wildlife on the refuge, including the spread of disease, competition for forage resources and exclusion of native wildlife from water sources. There are two sources of trespass cattle, a private grazing lease on BLM land to the east of the refuge and occasional cross

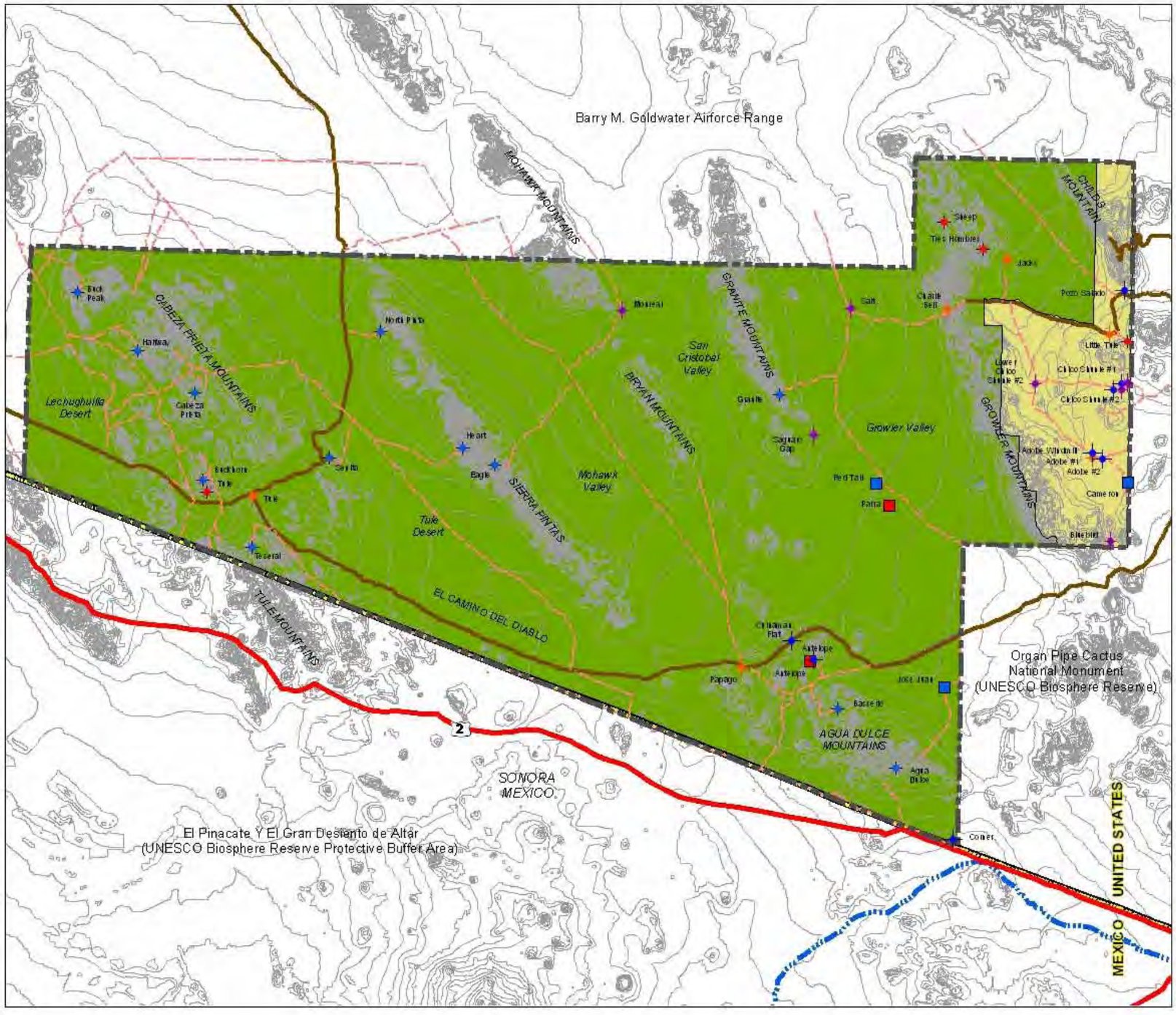


Figure 2.2 Developed Waters

Legend

- Cabeza Prieta N.W.R.
- Wilderness
- Non-Wilderness
- Public Roads
- Administrative Trails
- US/Mexico Border
- Highway
- Rio Sonoyta
- Active Well
- Active Tinaja / Tank
- Inactive Tinaja / Tank
- Inactive Well
- Capped Well
- Active Charco
- Inactive Charco

Sources: USFWS, 2006

0 1.5 3 6 9 12 Miles

CABEZA PRIETA
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE

border trespass from Mexico. Domestic goats from Mexico occasionally cross onto the refuge. Goats are particularly problematic as bot fly hosts. While bot flies are not a troublesome parasite to goats, bot fly larvae cause chronic sinusitis in wild desert bighorn sheep, a debilitating and frequently lethal condition. When livestock are encountered on the refuge, staff attempts to identify and contact the owner to facilitate removal. If the owner cannot be identified, trespass livestock are humanely removed.

2.2.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.2.2.1 Minimum Requirements Analysis

When management actions requiring use of vehicles, mechanized transport, or motorized equipment is proposed in wilderness, the refuge prepares a minimum requirements analysis for the proposed action.

2.2.2.2 Abandoned Vehicles Removal

When abandoned vehicles are found in the refuge wilderness they are removed as soon as possible. Normally, refuge staff tows the vehicles to the nearest non-wilderness road, typically El Camino del Diablo, using a refuge vehicle. Whenever feasible, the vehicle is towed along its entry track, thus avoiding new impacts to wilderness. Once removed to a road outside of wilderness, the vehicle is hauled off of the refuge by a commercial towing company. Vehicles abandoned on refuge non-wilderness are also removed as soon as possible, taking care to limit damage to vegetation and the soil surface.

2.2.2.3 Military Debris Removal

The only active military debris removal on the refuge is military removal of unexploded ordnance as it is found.

2.2.2.4 Administrative Trails

Approximately 234 kilometers (145 miles) of designated administrative trails occur within the wilderness portion of the refuge (see map, figure 2.3). These are unimproved or very lightly improved vehicle trackways established prior to wilderness designation in 1990. While these administrative trails remain, they are closed to all uses other than refuge management access, subject to MRA, and border law enforcement as provided in the Arizona Desert Wilderness Act of 1990. The *Final Programmatic Environmental Assessment for the Future Management of Cabeza Prieta National Wildlife Refuge and Draft Comprehensive Conservation Plan,* published in September of 1998, identified 224 kilometers (139 miles) of discernable vehicle trackways not part of the administrative trails system. These trails were slated for closure. Although the 1998 plan has not been implemented, these non-designated trails have not been considered part of the Administrative Trails system. The refuge has rehabilitated, and will continue to rehabilitate, such unofficial trails or other vehicle tracks in wilderness. Each year, refuge volunteers do a limited amount of rehabilitation to reclaim unauthorized trails in wilderness. Trail rehabilitation is accomplished using hand tools and natural materials from the immediate area or live native plants taken from alongside the public access roads. These plants would normally be damaged by vehicle traffic, so transplanting accomplishes the goal of protecting these plants as well as providing needed transplant specimens. Volunteers hike to all the sites. In areas where unauthorized trails lead deep into the wilderness, only approximately the first 400 meters (1/4 mile) of the road is reclaimed to conceal the trail and discourage its use. The refuge has documented approximately 400 kilometers (250 miles) of illegal roads and trails created by drug and illegal migrant smugglers and the law enforcement actions necessary to deter and

interdict the smugglers and illegal migrants and conduct life saving search and rescue operations. Refuge staff does not engage in rehabilitation efforts on these roads and trails because of the unpredictable use by smugglers and illegal migrants and law enforcement agents engaged in hot pursuit or search and rescue operations.

2.2.2.5 Wilderness Impact Monitoring

No change from the program described above in Section 2.1.3.3 under Elements Common to All Alternatives.

2.2.2.6 Border Law Enforcement

The Refuge coordinates with border law enforcement agencies as described above in Section 2.1.3.2, Elements Common to All Alternatives, Wilderness Stewardship.

2.2.2.7 Licensing Uses of the Childs Mountain Communications Site

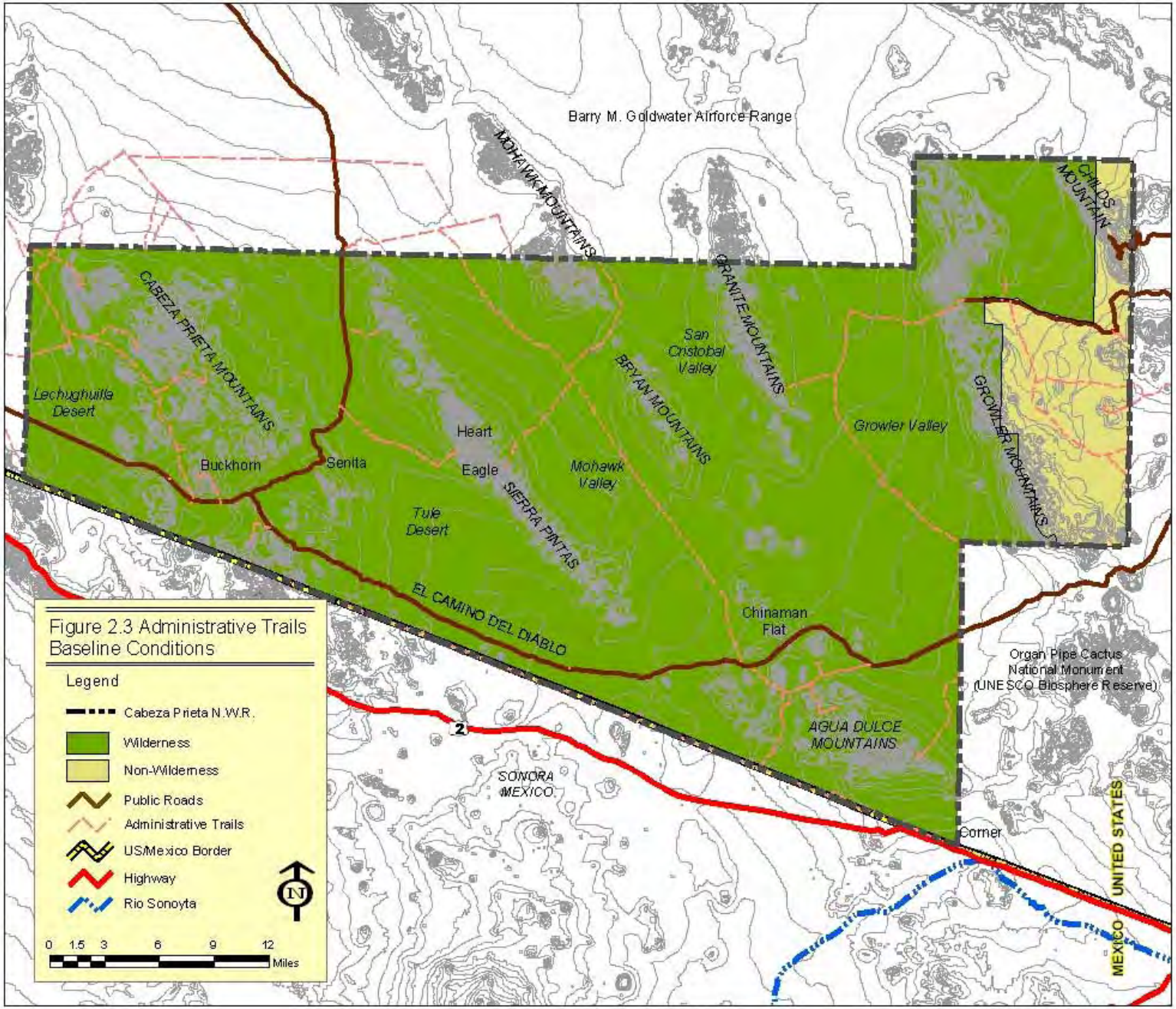
The Refuge allows use of a small area on the summit of Childs Mountain for government and private communications equipment by special use permit. Although located outside of the designated wilderness, this site is considered a wilderness issue, as the facilities are visible from the eastern portion of the refuge wilderness and several comments regarding their impact on wilderness character have been received. The refuge considers requests for new equipment sites on a “no-net increase of development foot print” basis. Uses that can be accommodated on existing towers or foundations are considered, those that would require new structures are not, unless determined necessary for public safety and protection.

2.2.3 Goal: Visitor Services

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding and protection of the plant, animal and wilderness resources of Cabeza Prieta NWR.

2.2.3.1 Managing Visitor Access

Access to the refuge, other than the visitor center, is by permit only. The refuge, the BMGR and BLM issue joint public access permits. Permits are available at several locations, including the refuge office and visitor center in Ajo, Luke Air Force Base in Phoenix, Marine Corps Air Station in Yuma, Gila Bend Auxiliary Air Base south of Gila Bend and the Bureau of Land Management Office in Phoenix. In accordance with their permit materials, visitors must contact the Auxiliary Air Base by telephone prior to entry and upon exit of BMGR. Effective July 1, 2006, visitors to the refuge are required to contact a refuge phone-in number prior to entering the refuge and leave a recorded message with the following information to assist the Fish and Wildlife Service in managing the refuge: permit number for each person in the party, date of entry, destination, length of visit and number of vehicles in the party. There is no requirement to contact the call in upon leaving the refuge. This information is used by the refuge to track numbers of visitors and routes of travel in the refuge. The permit clarifies that leaving this message does not assure search and rescue should the visitors encounter an emergency, but is for informational use only by the Service and the refuge. The current refuge access permit also serves as a military hold harmless agreement, in the case of injury caused by military activities or debris. Each recipient of an access permit also receives an informational packet outlining the rules and regulations for the BMGR and the Refuge. The refuge visitor center is staffed during normal business hours on weekdays year round.


Barry M. Goldwater Airforce Range
MOHAWK MOUNTAINS
CHILDS MOUNTAIN
GRANITE MOUNTAINS
CABEZA PRIETA MOUNTAINS
San Cristobal Valley
BRYAN MOUNTAINS
Lechuguilla Desert
Growler Valley
GROWLER MOUNTAINS
Heart
Buckhorn
Senita
Eagle
Mohawk Valley
SIERRA PINTAS
Tule Desert
EL CAMINO DEL DIABLO
Chinaman Flat
Organ Pipe Cactus National Monument (UNESCO Biosphere Reserve)
AGUA DULCE MOUNTAINS
SONORA MEXICO
Corner
UNITED STATES
MEXICO
Figure 2.3 Administrative Trails Baseline Conditions
Legend
Cabeza Prieta N.W.R.
Wilderness
Non-Wilderness
Public Roads
Administrative Trails
US/Mexico Border
Highway
Rio Sonoyta
N
0 1.5 3 6 9 12
Miles

El Camino del Diablo and Christmas Pass Road are restricted to four-wheel- drive, high clearance vehicles only. Charlie Bell Road is restricted to high clearance vehicles only (two-wheel-drive permitted). Vehicle travel is restricted to the existing roadway, with pull-off and parking allowed in the center 30 meters (100) feet of the 60-meter (200-foot) non-wilderness travel corridors along El Camino del Diablo and Christmas Pass Road. Only registered, street-legal vehicles are permitted on the refuge. Motor vehicles and mechanical transport are prohibited in designated wilderness. Pack and saddle stock are allowed only by special use permit (restrictions of the special use permit for pack and saddle stock include: a maximum of four horses, burros or mules per party; travel only on the administrative trails, dry washes and along the base of the mountain ranges; no grazing on the refuge or use of refuge water holes, tinajas, tanks, etc., to water stock; feed pellets or processed and pelletized feed only while on the refuge and for three days prior to entry; long-term stock camps (more than 2 nights) are permitted only in designated areas: Daniel's Arroyo, Lower Well, Agua Dulce, O'Neil Hills, Christmas Pass, Coyote Wash and Tule Tank (1.6 kilometer [1 mile] east of Tule Well); all surface disturbance at campsites must be restored; and all trash and animal waste must be removed from base camps). All visitors to wilderness receive orientation information on leave-no-trace wilderness use techniques.

2.2.3.2 Administering Hunt Program

2.2.3.2.1 Desert Bighorn Sheep

The refuge currently permits a limited desert bighorn sheep hunt, administered in cooperation with AGFD and allowed under a refuge special use permit (restrictions of the special use permit for hunting include those listed above for saddle and pack stock, as sheep hunters are the primary stock users on the refuge; the special use permit also allows detailed tracking of hunting on the refuge). The tag limit for bighorn has ranged between one and seven permits per year.

2.2.3.2.2 Mule Deer

None currently offered.

2.2.3.2.3 Small Game

None currently offered.

2.2.3.2.4 Predators

None currently offered.

2.2.3.3 Implementation of Leave-No-Trace Program

Leave-No-Trace (LNT) is a set of back-county travel and camping skills aimed at greatly reducing the overall impacts of outdoor recreation. The refuge provides all permitted back-country users an information packet including LNT information and detailing the generally prohibited uses of wilderness enumerated in the Wilderness Act of 1964. The refuge makes LNT information available to visitors and annually reviews LNT handouts for accuracy.

2.2.3.4 Provision of Environmental Education

Educational programs are presented to both public and private schools in the U.S. and Mexico at all grade-levels from Kindergarten to 12th grade. The refuge also responds to requests from local schools for natural history and other environmental education presentations.

2.2.3.5 Interpretation of Environmental Resources

The refuge visitor center includes a small visitor orientation area with several interpretive displays and a video, as well as an associated short interpretive trail. The refuge is currently attempting to acquire a 12-hectare (30-acre) parcel adjacent to the visitor center for development of a longer trail with more examples of Sonoran Desert resources.

The refuge has developed a watchable wildlife site on Childs Mountain with a short trail, shade structures and interpretive panels. Access to this site is for pre-arranged group tours only. The Cabeza Prieta Natural History Association provides group tours. The refuge will continue to work with the Cabeza Prieta Natural History Association to make interpretive tours available.

The refuge provides interpretation of the Sonoran Desert resources each February at the Sonoran Shindig. This is an annual celebration of the Sonoran Desert cosponsored by the refuge and the Ajo Chamber of Commerce. The Shindig includes cultural activities and displays interpreting the flora and fauna of the refuge. The refuge also hosts open houses during National Wildlife Refuge Week each October.

2.2.3.6 Managing Visitor Camping

Camping is considered necessary to support hunting, wildlife observation and photography, given the remoteness of the refuge, the difficulty of access to much of the refuge and the nocturnal or twilight activity of many desert wildlife species. The refuge offers both back-country and vehicle accessible camping. The following rules have been established to protect refuge resources and maintain wilderness character. Camping is prohibited within 400 meters (1/4 mile) of any wildlife water; fires are restricted to charcoal and camp stoves; and the maximum length of stay is 14 consecutive days. There are three developed, vehicle accessible, primitive camping areas with minimal amenities at Papago Well, Tule Well and Christmas Pass.

2.2.3.7 Pack and Saddle Stock Restrictions

While virtually all use of pack and saddle stock on the refuge has been by desert bighorn sheep hunters, any refuge visitor may use stock, subject to a special use permit, described above in Section 2.2.3.1. Control of pack and saddle stock, through the requirement of a special use permit, is appropriate. Pack and saddle stock cause much greater impacts on campsites and trails than do hikers (Spidlie *et al.,* 2000). There are five designated stock camps along the refuge public access roads.

2.2.4 Goal: Cultural Resources Management

Protect, maintain and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations.

2.2.4.1 General Provisions

This goal is addressed as described above in Section 2.1.4 under Elements Common to All Alternatives.

2.2.4.2 On-Site Interpretation

No on-site interpretation of cultural resources is provided.

2.2.4.3 Site Stabilization/Patrols

Other than checking the condition of known cultural resource sites while in their vicinity during other refuge management activities, no site stabilization or site patrols occur.

2.2.4.4 Inventory

No active inventory of cultural resources occurs on the refuge.

2.2.4.5 Training

Staff training does not focus on specific cultural resources conservation methods.

2.2.5 Staffing

The refuge currently employs thirteen full time staff, as summarized in: Table 2.4 The personnel costs of refuge operations and the effect of this employment on the local and regional economies are summarized below in Section 4.6.1.1.

Table 2.4: Refuge Staffing

Position	Number	Grade Level
Project Leader	1	GS-14
Deputy Project Leader	1	GS-13
Wildlife Biologist	1	GS-12,
Outdoor Recreation/ Outreach Specialist	1	GS-11
Law Enforcement (Supervisory)	1	GS-11
Law Enforcement	4	GS-9
Budget Administrator	1	GS-7
Maintenance Mechanic	1	WG-10
Maintenance Worker	1	WG-8
Office Assistant	1	GS-6

2.3 ALTERNATIVE 2: MINIMUM INTERVENTION

This alternative features an approach to refuge management that minimizes active intervention on ecological processes, particularly within the refuge wilderness areas. Other than management activities required for Sonoran pronghorn or other endangered species recovery, the refuge will not haul water in wilderness; develop new, or redevelop existing, wildlife waters; or otherwise attempt to support wildlife populations greater than those that refuge natural resources and precipitation support in the context of existing decimating factors. These factors include changes in native vegetation due to past over-grazing by domestic livestock, introduction of exotic plants and animal species, fragmentation of the habitats of wide ranging species and introduction of diseases from domestic livestock. Desert bighorn sheep hunting and use of pack and saddle stock would not be allowed under this alternative.

2.3.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.3.1.1 Endangered and Threatened Species

In addition to the measures described in Section 2.1.1 above, Elements Common to All Alternatives, the following measures will be implemented.

2.3.1.1.1 Sonoran Pronghorn

2.3.1.1.1.1 Population Monitoring

When weather and population conditions permit radio collaring Sonoran pronghorn, any collaring operations will proceed only in non-wilderness areas.

2.3.1.1.1.2 Developed Waters

The refuge will investigate the feasibility of obtaining photovoltaic powered water level sensors with remote transmission capability or other devices for remote water level monitoring. Should such devices be available they will be installed at each of the developed waters serving Sonoran pronghorn in wilderness, subject to MRA for waters in wilderness. Trips for hauling water will be made only when these sensors indicate that less than one week's supply of water remains. This would reduce the number of water hauling trips made to the minimum necessary to keep the developed waters from going dry. If no such devices are available, refuge management will continue to determine when to haul supplemental water as described above in Section 2.1.1.1.2.

2.3.1.1.1.3 Captive Breeding/Translocation

No change from that described above in Section 2.1.1.1.3, Elements Common to all Alternatives.

2.3.1.1.1.4 Area Closures

No change from that described above in Section 2.1.1.1.4, Elements Common to all Alternatives.

2.3.1.1.1.5 Supplemental Feeding and Forage Enhancements

Any additional supplemental feeding program or forage enhancements developed for Sonoran pronghorn beyond those described above in Section 2.1.1.1.5 will be located in non-wilderness areas.

2.3.1.1.1.6 Fencing

No change from that described above in Section 2.1.1.1.6, Elements Common to all Alternatives.

2.3.1.1.1.7 Predator Management

None.

2.3.1.1.1.8 Habitat Restoration Research

None is proposed.

2.3.1.1.2 Lesser Long-nosed Bat Conservation

No change is proposed from that described above in Section 2.1.1.2, Elements Common to all Alternatives.

2.3.1.1.3 Pierson's Milkvetch Surveys

No change is proposed from that described above in Section 2.1.1.4, Elements Common to all Alternatives.

2.3.1.1.4 Desert Pupfish Refugium

No change is proposed from that described above in Section 2.1.1.5, Elements Common to all Alternatives.

2.3.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.3.1.2.1 Developed Waters

There are currently 15 developed waters located within desert bighorn sheep habitat on the refuge. The refuge will cease hauling supplemental water to any desert bighorn sheep developed water located in wilderness other than Charlie Bell Well and Bassarisc Tank, which are also used by Sonoran pronghorn. This will mean cessation of hauling to Buck Peak, Halfway, Tuseral, Buckhorn, North Pinta, Senita, Granite, Heart and Eagle Tanks The refuge will continue to haul water to the Childs Mountain Parabolic Tank, in non-wilderness.

The refuge will initiate a phased removal of structural improvements to developed waters in wilderness, subject to MRA. This will entail removing small dams at the Cabeza Prieta Tanks and Heart Tank, both natural tinajas with low dams (less than 0.5 meter [1.6 foot] high) that were installed to increase water storage volume; removing sediment capturing dams above Buck Horn and Senita Tanks; removing an artificial catchment below the Agua Dulce spring; removing several shade covers; and discontinuing all scheduled maintenance of developed waters. Buckhorn Tank and Senita Tank, both adits, or short drilled depressions in rock, will not be filled, but will likely become filled with sediment in a few seasons due to the removal of sediment catching dams above the adits.

Those developed waters on or near illegal migrant pathways will receive special consideration. When hauling is ceased refuge staff will work with CBP-BP to establish emergency rescue beacons at these sites. MRAs will be completed for the rescue beacons.

The refuge will monitor the desert bighorn sheep population for any short term response to cessation of water hauling and removal of water development structures by monthly aerial surveys using visual search for bighorns in the vicinity of waters, as well as monitoring radio collared sheep for movement and mortality.

2.3.1.2.2 Forage Enhancements

None are proposed.

2.3.1.2.3 Population Goal

This alternative sets a refuge population goal for desert bighorn sheep of 100 to 200. This is a population goal aimed at addressing concerns that the current policy of supplying supplemental water to populations is artificially supporting unnaturally high numbers of sheep. Although this number is well below estimates of pre-contact sheep numbers in the area that became the refuge, it is believed to represent a realistic goal, given the continued existence of introduced diseases, habitat degradation by past grazing and habitat fragmentation beyond the limits of the refuge that restrict the population's long-term movement in response to weather patterns and climatic trends.

2.3.1.2.4 Predator Management

None is proposed.

2.3.1.3 Desert Ecosystem Integrity Monitoring

2.3.1.3.1 Cactus Ferruginous Pygmy-owl

The refuge will continue to survey for the presence of Cactus Ferruginous Pygmy-owl, as described above in Section 2.1.2.1, Elements common to All Alternatives.

2.3.1.3.2 Migratory Birds

Refuge staff will continue to monitor Le Conte's thrasher nests for reproductive success, renesting attempts and nest site characteristics.

2.3.1.3.3 Reptiles and Amphibians

The refuge will continue to survey abundance, distribution and breeding potential of amphibians.

2.3.1.3.4 Raptors and Ravens

No program for monitoring raptors and ravens proposed.

2.3.1.3.5 Game Animals

No monitoring or management program for game species on the refuge other than desert bighorn sheep is proposed.

2.3.1.3.6 Long-term Monitoring

The refuge will continue to monitor vegetation transects established in 2002 to detect changes in the refuge plant community.

2.3.1.3.7 Exotic/Invasive Species

Refuge staff will continue to record the location of exotic species infestations. Staff will continue to hand pull fountain grass where new infestations occur and remove trespass cattle, goats and burros. Should effective new methods of controlling exotic/invasive species be developed, they will be implemented on the refuge, pending a determination of suitability.

2.3.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.3.2.1 Minimum Requirements Analysis

The refuge will prepare a minimum requirements analysis whenever management actions requiring use of vehicles, mechanized transport, or motorized equipment are proposed in wilderness.

2.3.2.2 Abandoned Vehicles Removal

Abandoned vehicles will continue to be removed as they are found in the refuge wilderness. Refuge staff will tow the vehicle to the nearest non-wilderness road, typically El Camino del Diablo, using a refuge vehicle. Whenever feasible, the vehicle will be towed along its entry track, thus avoiding new impacts to wilderness. Once removed to a road outside of wilderness, the vehicle will be hauled off of the refuge by a commercial towing company. Vehicles abandoned on refuge non-wilderness will also be removed as soon as is feasible, taking care to limit damage to vegetation and the soil surface.

2.3.2.3 Military Debris Removal

Active military debris removal by the refuge will continue to include notification to the military of unexploded ordnance as it is found.

2.3.2.4 Administrative Trails

The refuge will close administrative trails in the wilderness other than the Welton Trail, the Mohawk Valley Trail, the Growler Valley Trail, Jack's Well Trail, the segment of the Agua Dulce Trail leading from El Camino del Diablo to Jose Juan Charco and the wilderness portion of Charlie Bell Road (see figure 2.4) to management vehicular use. This configuration will provide a minimum administrative trail network of access for general management activities such as abandoned vehicle removal throughout the refuge wilderness and allow vehicular water hauling to Jack's Well, Charlie Bell Well, and Jose Juan Charco as necessary for Sonoran pronghorn recovery activities.

These restrictions will end refuge management vehicular use of approximately 97 kilometers (60 miles) of administrative trails previously so used. The trails will be closed to management vehicular use, but will remain available to border law enforcement use under the provisions of the Arizona Desert Wilderness Act of 1990. Management vehicular use of the administrative trails not closed will continue to require an MRA. If future changes in management regime result permanent cessation of all water hauling, all the

administrative trails will be closed to refuge management use.

2.3.2.5 Wilderness Impact Monitoring

In addition to continuation of the ongoing wilderness impact monitoring described above in Section 2.1.3.3 under Elements Common to All Alternatives, the refuge will work with the Regional Office remote sensing staff to design an aerial photography program to monitor impacts of trail development by undocumented aliens or narcotics traffickers crossing the refuge. Photography flown in 1994 by the Department of Commerce's Borderlands Project can serve as a baseline for comparison. Refuge field staff will identify areas known to be impacted by illegal traffic. This information will be used to identify areas of the refuge to be flown and photographed on a biennial basis.

Refuge staff will maintain a database of all observed adverse impacts to wilderness, whether caused by refuge management, border law enforcement, visitor use or illegal activities. These data and those from wilderness impact monitoring will support the wilderness research described above in Section 2.1.5.2.

2.3.2.6 Border Law Enforcement

The Refuge will continue to coordinate with border law enforcement agencies described above in Section 2.1.3.2, Elements Common to All Alternatives, Wilderness Stewardship.

2.3.2.7 Licensing Uses at the Childs Mountain Communications Site

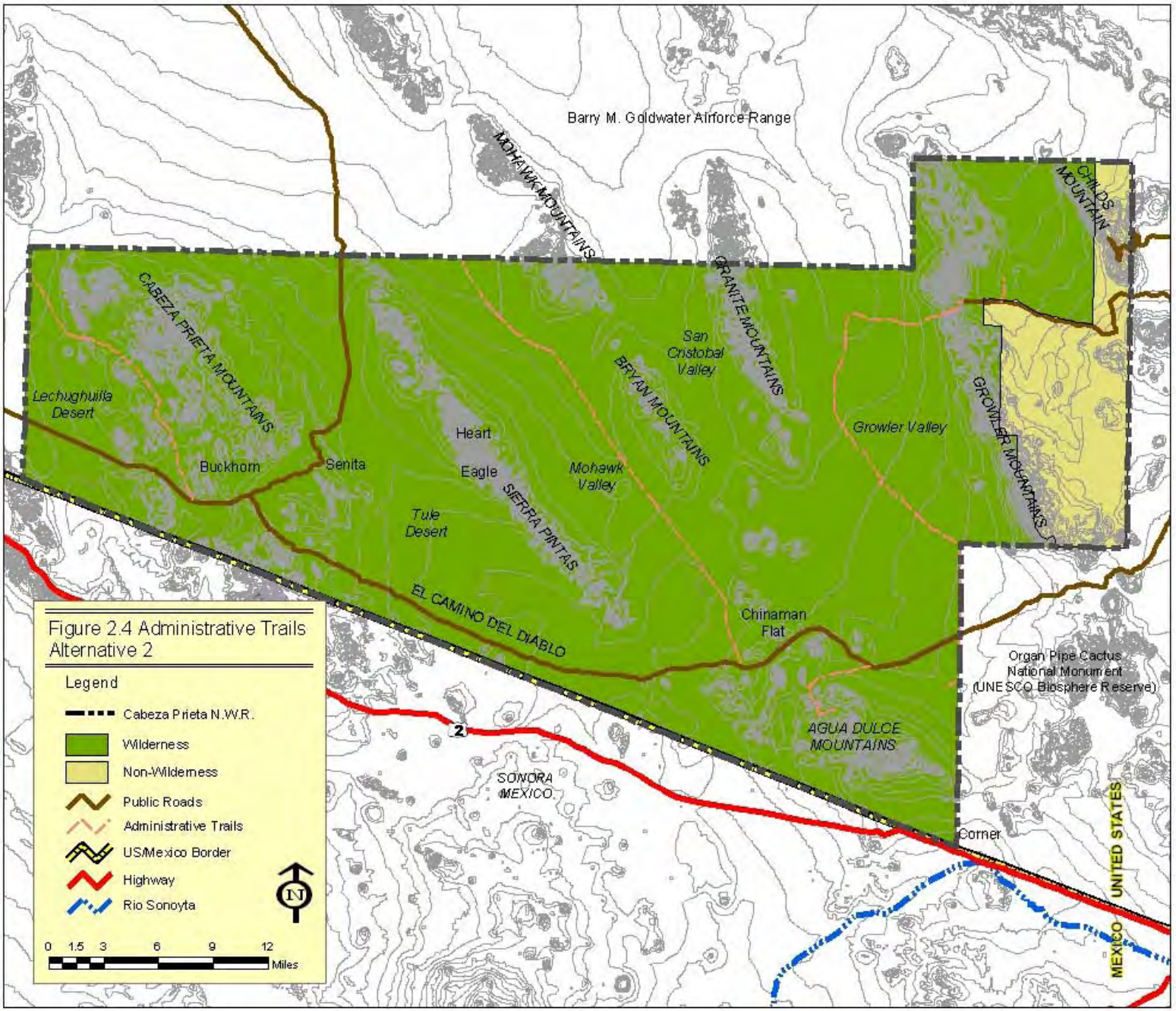
The refuge will work with the FAA, the military and commercial lessees of the Childs Mountain site to assure that all facilities are removed from the site upon the termination of the existing memorandum of understanding between the Service, the military and the FAA. The refuge will work with the military to identify any obsolete buildings or other structures on the site and have them removed.

2.3.3 Goal: Visitor Services

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding and protection of the plant, animal and wilderness resources of Cabeza Prieta NWR.

2.3.3.1 Managing Visitor Access

Access to the refuge, other than the Visitor Center, is by permit only. The refuge, BMGR and BLM will continue to issue joint public access permits. Permits will be available at several locations, including the refuge office and visitor center in Ajo, Luke Air Force Base in Phoenix, Marine Corps Air Station Yuma in Yuma, Gila Bend Air Force Auxiliary Field south of Gila Bend and the Bureau of Land Management Office in Phoenix. In accordance with their permit materials, visitors must contact the Auxiliary Air Base by telephone prior to entry and upon exit of BMGR. Visitors to the refuge are required to contact a refuge phone-in number prior to entering the refuge and leave a recorded message with the following information to assist the Fish and Wildlife Service in managing the refuge: permit number for each person in the party, date of entry, destination, length of visit and number of vehicles in the party. There is no requirement to contact the call in upon leaving the refuge. This information is used by the refuge to track numbers of visitors and routes of travel in the refuge. The permit clarifies that leaving this message does not assure search and rescue should the visitors encounter an emergency, but is for informational use only by the refuge. The refuge access permit will continue to serve as a military hold harmless agreement, in case


Barry M. Goldwater Airforce Range
MOHAWK MOUNTAINS
CHILDS MOUNTAIN
CABEZA PRIETA MOUNTAINS
GRANITE MOUNTAINS
San Cristobal Valley
BRYAN MOUNTAINS
GROWLER MOUNTAINS
Growler Valley
Lechughuilla Desert
Buckhorn
Senita
Heart
Eagle
Mohawk Valley
Tule Desert
SIERRA PINTAS
EL CAMINO DEL DIABLO
Chinaman Flat
Organ Pipe Cactus National Monument (UNESCO Biosphere Reserve)
AGUA DULCE MOUNTAINS
SONORA MEXICO
Corner
UNITED STATES
MEXICO
2
Figure 2.4 Administrative Trails Alternative 2
Legend
Cabeza Prieta N.W.R.
Wilderness
Non-Wilderness
Public Roads
Administrative Trails
US/Mexico Border
Highway
Rio Sonoyta
N
0 1.5 3 6 9 12
Miles

of injury caused by military activities or debris. Each recipient of an access permit will also receive an informational packet outlining the rules and regulations for the BMGR and the Refuge.

Only registered, street-legal vehicles will be permitted on the refuge. El Camino del Diablo and Christmas Pass Road will remain restricted to four-wheel-drive, high clearance vehicles only, and Charlie Bell Road to high clearance vehicles only (two-wheel-drive permitted). Vehicle travel remains restricted to the established roadway, with pull-off and parking allowed in the center 30 meters (100 feet) of the 60-meter (200-foot) non-wilderness travel corridors along el Camino del Diablo and Christmas Pass Road. Use of motor vehicles and other forms of mechanical transport remains prohibited in designated wilderness.

Pack and Saddle stock will no longer be permitted in the refuge.

2.3.3.2 Administering Hunt Program

2.3.3.2.1 Desert Bighorn Sheep

No hunting will be allowed in the refuge.

2.3.3.2.2 Mule Deer

No hunting will be allowed in the refuge.

2.3.3.2.3 Small Game

No hunting will be allowed in the refuge.

2.3.3.2.4 Predators

No hunting will be allowed in the refuge.

2.3.3.3 Implementation of Leave-No-Trace Program

Leave-No-Trace (LNT) is a set of back county travel and camping skills aimed at greatly reducing the overall impacts of outdoor recreation. The refuge provides all permitted back-country users an information packet including LNT information and detailing the generally prohibited uses of wilderness enumerated in the Wilderness Act of 1964. The refuge will continue to make LNT information available to visitors and annually review LNT handouts for accuracy. The leader of any group requiring a special use permit for refuge access will be required to have received LNT training.

2.3.3.4 Provision of Environmental Education

The refuge will continue to respond to requests from local schools for natural history and other environmental education presentations.

2.3.3.5 Interpretation of Natural Resources

The refuge visitor center includes a small visitor orientation area with several interpretive displays and video, as well as an associated short interpretive trail.

Access to the watchable wildlife site on Childs Mountain site will remain restricted to pre-arranged group tours only. The refuge will continue to work with the Cabeza Prieta Natural History Association to make interpretive tours available.

The refuge will continue to provide interpretation of the Sonoran Desert resources each February at the Sonoran Shindig. This annual celebration of the Sonoran Desert is cosponsored by the refuge and the Ajo Chamber of Commerce. The Shindig includes cultural activities and displays interpreting the flora and fauna of the refuge. The refuge will also host open houses during National Wildlife Refuge Week each October. The visitor center will remain open seven days a week during the winter season (October through April), in order to maximize contact with refuge visitors and maximize transmission of the resource protection message.

2.3.3.6 Managing Visitor Camping

Camping is considered necessary to support wildlife observation and photography, given the remoteness of the refuge, the difficulty of access to much of the refuge and the nocturnal or twilight activity of many desert wildlife species. The refuge will continue to offer both back-country and vehicle accessible camping. The following rules will be enforced to protect refuge resources and maintain wilderness character: camping is prohibited within 400 meters (1/4 mile) of any wildlife water; fires are restricted to charcoal and camp stoves; the maximum length of stay is seven consecutive days; and parties of more than eight campers will require a special use permit (Monz *et al.* 2000 provide a discussion of the reasons to limit party size in wilderness). One developed, vehicle accessible, primitive camping area with minimal amenities will be retained at Tule Well.

2.3.3.7 Pack and Saddle Stock Restrictions

No pack or saddle stock will be allowed on the refuge

2.3.4 Goal: Cultural Resources Management

Protect, maintain and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations.

2.3.4.1 General Provisions

This goal is addressed as described above in Section 2.1.4 under Elements Common to All Alternatives.

2.3.4.2 On-Site Interpretation

No on-site interpretation of cultural resources is proposed.

2.3.4.3 Site Stabilization/Patrols

Other than continuing to check the condition of known cultural resource sites when refuge staff are in their vicinity during other refuge management activities, no site stabilization or site patrols is proposed.

2.3.4.4 Inventory

No active inventory of cultural resources on the refuge is proposed.

2.3.4.5 Training

Staff training will not focus on specific cultural resources conservation methods.

2.3.5 Staffing

In order to implement this management alternative, the refuge will need to add one full time position beyond that of the no-action scenario. This position will assist in keeping the visitor center open seven days a week during the winter season. The required staffing level is summarized in Table 2.5. The cost of implementing this staffing level, and its impacts on the local and regional economy are summarized below in Section 4.6.1.1.

Table 2.5: Refuge Staffing

Position	Number	Grade Level
Project Leader	1	GS-14
Deputy Project Leader	1	GS-13
Wildlife Biologist	1	GS-12,
Outdoor Recreation/ Outreach Specialist	1	GS-11
Law Enforcement (Supervisory)	1	GS-11
Law Enforcement	4	GS-9
Budget Administrator	1	GS-7
Maintenance Mechanic	1	WG-10
Maintenance Worker	1	WG-8
Office Assistant	1	GS-6
Office Assistant	1	GS-5

2.4 ALTERNATIVE 3: RESTRAINED INTERVENTION

This alternative emphasizes preserving the refuge's wilderness character. It focuses on restoring the natural conditions and self-sustaining ecosystem processes that will support healthy populations of native species. This alternative assumes that permanent, artificial structures and installations, no matter how well camouflaged, are inappropriate in wilderness. This alternative will support wildlife populations primarily with naturally occurring precipitation; supplemental water will be provided to developed waters as an infrequent measure during periods of extreme drought, rather than as a response to summertime desert conditions. While not embracing aggressive manipulation of habitats and processes, this alternative recommends some habitat manipulation to restore endangered species and would take additional steps, if necessary, to protect them. By restoring degraded portions of the habitat (e.g. by establishing wildlife corridors in non-wilderness) the wilderness itself can maintain its wildness and be free from man's control. This alternative also favors increased habitat management outside of wilderness and working aggressively with adjacent landowners and other partners to reduce active management in the wilderness.

2.4.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.4.1.1 Endangered and Threatened Species

The refuge will continue to participate in recovery of endangered and threatened species as described above in Section 2.1.1 under Elements Common to All Alternatives, with the following additions.

2.4.1.1.1 Sonoran Pronghorn

2.4.1.1.1.1 Population Monitoring

No change is proposed from that described above in Section 2.1.1.1.1, under Elements Common to all Alternatives.

2.4.1.1.1.2 Developed Waters

The refuge will investigate the feasibility of obtaining photovoltaic powered water level sensors with remote transmission capability or other devices for remote water level monitoring. Should such devices be available they will be installed at each of the developed waters serving Sonoran pronghorn in wilderness, subject to MRA for waters in wilderness. Trips for hauling water will be made only when these sensors indicate that less than one week's supply of water remains. This would reduce the number of water hauling trips made to the minimum necessary to keep the developed waters from going dry. If no such devices are available, refuge management will continue to determine when to haul supplemental water as described in Section 2.1.1.1.2 above. Water will be hauled to Jose Juan and Redtail Charcos only during periods of severe drought (a value of negative three or lower on the Palmer Drought Index – a measure of drought severity that considers rainfall and heat). During radio telemetry studies of Sonoran pronghorn conducted by refuge staff, the area surrounding these waters showed very low density of pronghorn. This led some to conclude that the charcos are poorly located for use by Sonoran pronghorn under normal conditions.

Refuge staff will annually collect water samples from all developed waters. Samples will be analyzed for pathogens and their potential to adversely affect the health of Sonoran pronghorn.

The refuge will place greater emphasis on working with the Air Force, Marine Corps and BLM to have developed waters established in Sonoran pronghorn habitat adjacent to the refuge wilderness. As the Sonoran Pronghorn Recovery Plan states, "moving great distances in search of ephemeral resources" is crucial to the pronghorn

survival and that "Expanding present used range east of highway 85 and north of Interstate 8 might prove to be the most effective recovery effort", these efforts are appropriate.

2.4.1.1.1.3 Captive Breeding/Translocation

No change is proposed from that described above in Section 2.1.1.1.3, Elements Common to all Alternatives.

2.4.1.1.1.4 Area Closures

No change is proposed from that described above in Section 2.1.1.1.4, Elements Common to all Alternatives.

2.4.1.1.1.5 Supplemental Feeding and Forage Enhancements

No change is proposed from that described above in Section 2.1.1.1.5, Elements Common to all Alternatives.

2.4.1.1.1.6 Fencing

The refuge will work with its partners to develop wildlife corridors to the east across Arizona Highway 85 and north across the BMRG. The refuge will work with BLM to eliminate grazing on adjacent lands and then remove fences.

2.4.1.1.1.7 Predator Management

The refuge will implement studies, including radio collaring, to investigate use of developed waters, size of home range and breeding success of coyote on the refuge. These studies will also include review of data on predation on Sonoran pronghorn collected on BMGR and OPCNM. Selective removal of coyotes will be implemented when the Sonoran pronghorn population is below 100 animals and winter and spring precipitation is 50 percent or less of average.

2.4.1.1.1.8 Habitat Restoration Research

The refuge will invite partners to develop large-scale experimental desert restoration sites in refuge non-wilderness. If successful restoration techniques are developed, they will be implemented to restore degraded sites on the refuge. Degraded sites most important to pronghorn survival will be identified as the highest priority sites for applying desert wilderness restoration work.

2.3.1.1.2 Lesser Long-nosed Bat Conservation

No change is proposed from that described above in Section 2.1.1.2, Elements Common to all Alternatives.

2.4.1.1.3 Pierson's Milkvetch Surveys

No change is proposed from that described above in Section 2.1.1.4, Elements Common to all Alternatives.

2.4.1.1.4 Desert Pupfish Refugium

No change is proposed from that described above in Section 2.1.1.5, Elements Common to all Alternatives.

2.4.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.4.1.2.1 Developed Waters

There are currently 15 developed waters located within desert bighorn sheep habitat on the refuge. The refuge will reduce the frequency of hauling supplemental water to any developed water located in wilderness other than Bassarisc Tank and Charlie Bell Well, which are also used by Sonoran pronghorn. Water will be hauled to Buck Peak, Halfway, Tuseral, Bassarisc, North Pinta, Granite, Heart and Eagle Tanks only during periods of severe drought (Palmer Drought Index value of negative three or less). The refuge will continue to haul water to the Childs Mountain Parabolic Tank, in non-wilderness.

The refuge will initiate a phased removal of structural improvements to developed waters in wilderness, subject to MRA. This will entail removing small dams at the Cabeza Prieta Tanks and Heart Tank, both natural tinajas with low dams (less than 0.5 meter [1.6 foot] high) that were installed to increase water storage volume but may have unintended effects on water quality and overall hydrology; removing an artificial catchment below the Agua Dulce spring; removing any shade covers; and discontinuing scheduled maintenance of developed waters. Buckhorn Tank and Senita Tank, both adits, or short drilled depressions in rock, will not be filled, but will likely become filled with sediment over time in the absence of scheduled maintenance.

The refuge will survey non-wilderness desert bighorn sheep habitat (the eastern portions of the Growler Mountains and Childs Mountain) for potential sites of new developed waters. New waters will be developed in suitable, non-wilderness sites.

The refuge will monitor the desert bighorn sheep population for any short term response to reduction of water hauling and removal of water development structures by monthly aerial surveys using visual search for bighorns in the vicinity of waters, as well as monitoring radio collared sheep for movement and mortality.

2.4.1.2.2 Forage Enhancements

None is proposed.

2.4.1.2.3 Population Goal

This alternative sets a refuge population goal for desert bighorn sheep of 250 to 350. This range has been extrapolated by computing the average density of sheep per acre in southwestern Arizona mountain ranges similar to those in the refuge (approximately two sheep per acre). A correction factor of one half was applied to account for the fact that the mountain ranges in question include maintained developed waters. The resulting value of one sheep per acre was multiplied by the refuge's 290 square miles of desert bighorn sheep habitat. The range is considerably lower than the population range that was likely supported by resources in the area of the refuge prior to the introduction of disease by domestic stock, the fragmentation of habitats by modern land management practices and the degradation of native habitats from grazing by domestic stock decimated native desert bighorn sheep populations.

2.4.1.2.4 Predator Management

Within two years the refuge will implement studies, including radio collaring, to investigate use of developed waters, size of home range, breeding success, movements of mountain lion within the refuge and mountain lion movement relative to desert bighorn sheep movement. These studies will also include review of data on predation on desert bighorn sheep collected on BMGR and OPCNM.

2.4.1.3 Desert Ecosystem Integrity Monitoring

2.4.1.3.1 Cactus Ferruginous Pygmy-owl

No change is proposed from that described above in Section 2.1.2.1, Elements Common to all Alternatives.

2.4.1.3.2 Migratory Birds

Refuge staff will continue to monitor Le Conte's thrasher nests for reproductive success, re-nesting attempts and nest site characteristics.

2.4.1.3.2 Reptiles and Amphibians

The refuge will continue to survey abundance, distribution and breeding potential of amphibians.

2.4.1.3.4 Raptors and Ravens

No monitoring of raptors and ravens is proposed.

2.4.1.3.5 Game Animals

No monitoring or management program for any game animal other than desert bighorn sheep is proposed.

2.4.1.3.6 Long-term Monitoring

The refuge will continue to monitor vegetation transects established in 2002 to detect changes in the refuge plant community. Additionally, the refuge and the Regional Office remote sensing scientist will implement a change detection analysis program, using aerial photography sampling (i.e., photography will be taken of a random sample of the refuge, as full photographic coverage of the refuge would be too large to effectively analyze). Analysis of photography taken every two years and comparison of photography from different years and archival photography will allow identification of changes in vegetation community composition and density. The data generated by this monitoring project will be tracked to identify existing sources of change and evaluate their causes and importance.

2.4.1.3.7 Exotic/Invasive Species Control

The *Checklist of the Plants of Cabeza Prieta National Wildlife Refuge, Arizona* lists 32 non-native plant species that occur on the refuge (Felger 1998). This list is presented in Appendix E. Three non-native species, fountain grass, buffelgrass and Sahara mustard, have become established at infestation levels on the refuge. These species have the potential to out-compete native species for resources and reduce the density of native flora on the refuge. Sahara mustard is of particular concern as it appears to be infesting the Pinta Sands area, which has supported a native sand dune endemic community considered to be an important food source for Sonoran pronghorn. Refuge staff will continue to be trained to recognize these species and will continue to document any occurrences encountered during fieldwork. The refuge will continue to remove newly discovered occurrences of fountain grass by hand pulling to limit its spread and eliminate new small infestations where feasible. To prevent new infestations to the greatest degree feasible, refuge staff will visually inspect refuge vehicles, clothing and equipment for seeds or other plant propagules prior to entering the refuge.

The refuge will establish a native plant nursery in non-wilderness for revegetation efforts.

Trespass livestock present a variety of potential problems to native wildlife on the refuge, including the

spread of disease, competition for forage resources and exclusion of native wildlife from water sources. There are two sources of trespass cattle, a private grazing lease on BLM land to the east of the refuge and occasional cross border trespass from Mexico. Domestic goats from Mexico occasionally cross onto the refuge. Goats are particularly problematic as bot fly hosts. While bot flies are not a troublesome parasite to goats, bot fly larvae cause chronic sinusitis in wild desert bighorn sheep, a debilitating and frequently lethal condition. When livestock are encountered on the refuge, staff will attempt to identify and contact the owner to facilitate removal. If the owner cannot be identified, trespass livestock will be humanely removed.

2.4.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.4.2.1 Minimum Requirements Analysis

The refuge will streamline the MRA process described above in 2.1.3.1 under Elements Common to All Alternatives, Wilderness Stewardship, by establishing programmatic MRAs for all predictable, recurring activities, such as water hauling, wildlife surveys, removal of abandoned vehicles and water sample collection, which require generally prohibited uses of wilderness. These programmatic MRAs will not relieve the refuge of the requirement to conduct activity-specific MRAs in each case of water hauling, vehicle removal or other activities. The process of preparing activity-specific MRAs will be simplified by the existence of programmatic MRAs, in that staff will focus on the unique aspects of each type of activity (e.g., location of vehicle to be removed, season and recent weather for water hauling).

2.4.2.2 Abandoned Vehicle Removal

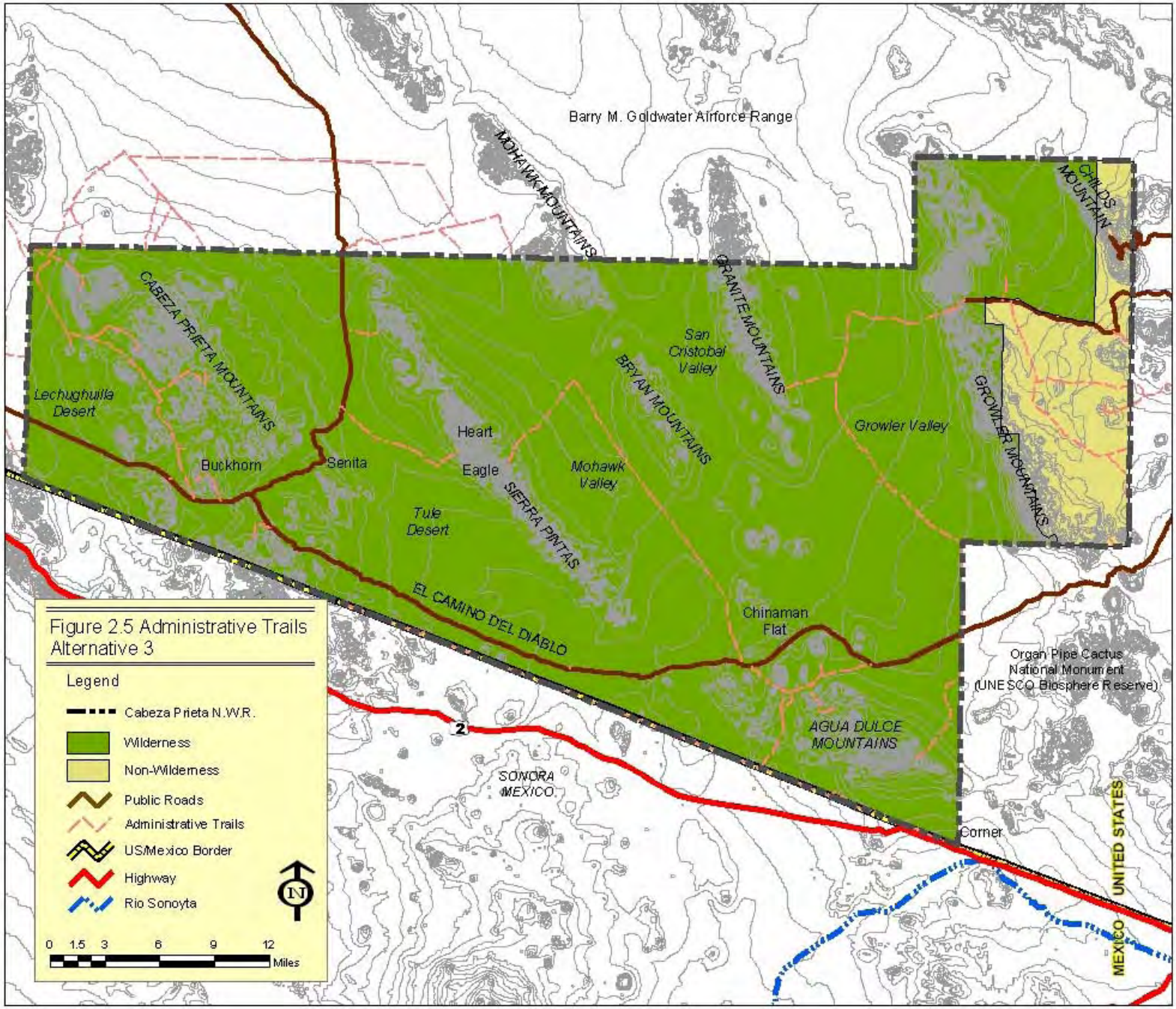
Abandoned vehicles will continue to be removed as they are found in the refuge wilderness, subject to an MRA. In the case of vehicles abandoned in wilderness, refuge staff will tow the vehicle to the nearest non-wilderness road, typically El Camino del Diablo, using a refuge vehicle. Whenever feasible, the vehicle will be towed along its entry track, thus avoiding new impacts to wilderness. Once removed to a road outside of wilderness, the vehicle will be hauled off of the refuge by a commercial towing company. The refuge will also reexamine the feasibility entering a memorandum of agreement with adjacent military commands to make heavy-lift military helicopters available for removing abandoned vehicles from refuge wilderness. Vehicles abandoned on refuge non-wilderness will also be removed as soon as is feasible, taking care to limit damage to vegetation and the soil surface (the refuge examined this technique in 2002 but no military airlift commands were willing to assume the risks involved in removing vehicles at that time).

2.4.2.3 Military Debris Removal

Active military debris removal by the refuge will continue to include notification to the military of unexploded ordnance as it is found. The refuge will actively coordinate with the military and volunteers to remove tow darts and tow cable from the refuge, using appropriate means in wilderness to accomplish removal. Refuge staff will develop standards to prioritize tow darts for removal.

2.4.2.4 Administrative Trails

The refuge will close Monreal Well Trail, Tractor Trail and the Mohawk Trail north of Eagle Tank Trail in the wilderness to management vehicular use (see figure 2.5). These restrictions will end refuge management


Barry M. Goldwater Airforce Range
MOHAWK MOUNTAINS
CHILDS MOUNTAIN
CABEZA PRIETA MOUNTAINS
GRANITE MOUNTAINS
San Cristobal Valley
BRYAN MOUNTAINS
GROWLER MOUNTAINS
Lechuguilla Desert
Heart
Eagle
Buckhorn
Senita
Mohawk Valley
Growler Valley
Tule Desert
SIERRA PINTAS
EL CAMINO DEL DIABLO
Chinaman Flat
Organ Pipe Cactus National Monument (UNESCO Biosphere Reserve)
AGUA DULCE MOUNTAINS
SONORA MEXICO
Corner
UNITED STATES
MEXICO
2
Figure 2.5 Administrative Trails Alternative 3
Legend
Cabeza Prieta N.W.R.
Wilderness
Non-Wilderness
Public Roads
Administrative Trails
US/Mexico Border
Highway
Rio Sonoyta
N
0 1.5 3 6 9 12
Miles

vehicular use of approximately 32 kilometers (20 miles) of administrative trails previously so used. The trails are closed to management vehicular use, but will remain available to border law enforcement use under the provisions of the Arizona Desert Wilderness Act of 1990. Management vehicular use of the administrative trails not closed will continue to require an MRA.

Refuge staff will coordinate with CBP-BP staff to identify which of the Administrative Trails closed to management vehicular use are not needed for border law enforcement patrols. The refuge will rehabilitate the first 400 meters (1/4 mile) of these trails to discourage their use.

If future changes in management regime result permanent cessation of all water hauling, all the administrative trails will be closed to refuge management use.

2.4.2.5 Wilderness Impact Monitoring

In addition to continuation of the ongoing wilderness impact monitoring described above in 2.1.3.3 under Elements Common to All Alternatives, Wilderness Stewardship, the refuge will work with the Regional Office remote sensing staff to design an aerial photography program to monitor impacts of trail development by undocumented aliens or narcotics traffickers crossing the refuge. Photography flown in 1994 by the Department of Commerce's Borderlands Project can serve as a baseline for comparison. Refuge field staff will identify areas known to be impacted by illegal traffic. This information will be used to identify areas of the refuge to be flown and photographed on a biennial basis.

The refuge will develop standard protocols for monitoring aspects of wilderness character such as solitude, naturalness, etc. and will develop a monitoring program, but without adequate funding and staffing it will be difficult to conduct this program.

Refuge staff will maintain a database of all observed adverse impacts to wilderness, whether caused by refuge management, illegal activities, border law enforcement or visitor use. These data and those generated by wilderness impact monitoring will support the wilderness research described above in Section. 2.1.5.2.

2.4.2.6 Border Law Enforcement

The refuge will continue to provide orientation and wilderness training for border law enforcement personnel.

2.4.2.7 Licensing Uses of the Childs Mountain Communications Site

The refuge will work with the Federal Aviation Administration (FAA), the military and commercial lessees of the Childs Mountain site to assure that all facilities are removed from the site upon the termination of the existing memorandum of understanding between the Service, the military and the FAA. The refuge will work with the military to identify any obsolete buildings or other structures on the site and have them removed.

2.4.3 Goal: Visitor Services

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding and protection of the plant, animal and wilderness resources of Cabeza Prieta NWR.

2.4.3.1 Managing Visitor Access

Access to the refuge, other than the Visitor Center, is by permit only. The refuge, the BMGR and BLM will continue to issue joint public access permits. Permits will be available at several locations, including the refuge office and visitor center in Ajo, Luke Air Force Base in Phoenix, Marine Corps Air Station Yuma, Gila Bend Auxiliary Air Base in Gila Bend, and the Bureau of Land Management office in Phoenix. Visitors must contact the Auxiliary Air Base by telephone prior to entry and upon exit of permitted BMGR. Visitors to the refuge are required to contact a refuge phone-in number prior to entering the refuge and leave a recorded message with the following information to assist the Fish and Wildlife Service in managing the refuge: permit number for each person in the party, date of entry, destination, length of visit and number of vehicles in the party. There is no requirement to contact the call in upon leaving the refuge. This information is used by the refuge to track numbers of visitors and routes of travel in the refuge. The permit clarifies that leaving this message does not assure search and rescue should the visitors encounter an emergency, but is for informational use only by the refuge. The refuge access permit will continue to serve as a hold harmless agreement protecting the military from any liability if refuge visitors are harmed by military activities or debris. Each recipient of an access permit will also receive an informational packet outlining the rules and regulations for the BMGR and the refuge. The refuge will coordinate with the military and BLM to ensure that every visitor to the refuge receives Leave No Trace travel and camping information.

El Camino del Diablo and Christmas Pass Road will remain restricted to four-wheel-drive, high clearance vehicles only, and Charlie Bell Road to high clearance vehicles only (two-wheel-drive permitted). Vehicles remain restricted to the established roadway, with pull-off and parking limited to the center 30 meters (100 feet) of the 60-meter (200-foot) non-wilderness corridors.

2.4.3.2 Administering Hunt Program

2.4.3.2.1 Desert Bighorn Sheep

The refuge will continue to offer a limited desert bighorn sheep hunt, administered in cooperation with AGFD and allowed under a refuge special use permit. No hunt will be offered during years in which water was hauled due to severe drought.

2.4.3.2.2 Mule Deer

No hunting will be allowed on the refuge.

2.4.3.2.3 Small Game

No hunting will be allowed on the refuge.

2.4.3.2.4 Predators

Non hunting will be allowed on the refuge.

2.4.3.3 Implementing Leave-No-Trace Program

Leave-No-Trace (LNT) is a set of backcountry travel and camping skills aimed at greatly reducing the overall impacts of outdoor recreation. The refuge will continue to provide all permitted backcountry users an information packet including LNT information and detailing the generally prohibited uses of wilderness enumerated in the Wilderness Act of 1964. The refuge will continue to make LNT information available to

visitors and annually review LNT handouts for accuracy. All visitor contact refuge employees and interested volunteers will be provided annual opportunities to receive LNT training.

2.4.3.4 Provision of Environmental Education

The refuge will continue to respond to requests from local schools for natural history and other environmental education presentations and associated instructional materials for use by staff and educators. The refuge will also develop a Sonoran Desert ecosystem-specific environmental education program for use by staff in schools and other venues. This program will include a discussion of wilderness values.

2.4.3.5 Interpretation of Natural Resources

The refuge will develop a new general refuge video for visitor orientation. The refuge will also acquire the Wilderness Awareness video produced by the Carhart Center for visitor orientation. The refuge will upgrade existing interpretative materials and programs at the refuge visitor center. All such materials and programs will include discussion of the effects of modern human land uses on Sonoran Desert wildlife.

The refuge will develop public information, including interpretive pamphlets available at the visitor center, regarding the beneficial attributes of bats, such as plant pollination.

The refuge will continue to provide interpretation of the Sonoran Desert resources each February at the Sonoran Shindig. This is an annual celebration of the Sonoran Desert is cosponsored by the refuge and the Ajo Chamber of Commerce. The Shindig includes cultural activities and displays interpreting the flora and fauna of the refuge. The refuge will also host open houses during National Wildlife Refuge Week each October.

The refuge will develop additional interpretive signage and overlooks in non-wilderness areas. Pending a determination that Sonoran pronghorn populations have stabilized and that such use would not jeopardize the subspecies, the refuge will pursue cooperation of the BLM on developing a road loop in the non-wilderness portion of the Childs Valley.

2.4.3.6 Managing Visitor Camping

Camping is considered necessary to support hunting, wildlife observation and photography, given the remoteness of the refuge, the difficulty of access to much of the refuge and the nocturnal or twilight activity of many desert wildlife species. The refuge will continue to offer both back-country and vehicle accessible camping. The following rules will be enforced to protect refuge resources and maintain wilderness character: camping is prohibited within 400 meters (1/4 mile) of any wildlife water; fires are restricted to charcoal and camp stoves; the maximum length of stay is seven consecutive days; and parties of more than eight campers will require a special use permit (Monz *et al.,* 2000, provide a discussion of the reasons to limit party size in wilderness). One developed, vehicle accessible primitive camping area with minimal amenities will be retained at Tule Well.

2.4.3.7 Pack and Saddle Stock Restrictions

Pack and saddle stock use by visitors will continued to be allowed subject to a special use permit, described above in Section 2.2.3.1.

2.4.4 Goal: Cultural Resources Management

Protect, maintain and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations

2.4.4.1 General Provisions

This goal is addressed as described above in Section 2.1.4 under Elements Common to All Alternatives.

2.4.4.2 On-Site Interpretation

No on-site interpretation of cultural resources is proposed.

2.4.4.3 Site Stabilization/Patrols

Other than continuing to check the condition of known cultural resource sites when refuge staff is in their vicinity during other refuge management activities, no site stabilization or site patrols are proposed.

2.4.4.4 Inventory

No active inventory of cultural resources on the refuge is proposed.

2.4.4.5 Training

No staff training focused on protection of cultural resources is proposed.

2.4.5 Staffing

In order to implement this management alternative, the refuge will need to add two full time positions beyond the level of the no-action scenario. These positions, one wildlife biologist and one maintenance worker, reflect increased wildlife monitoring efforts. The required staffing level is summarized in Table 2.6. The cost of implementing this staffing level, and its impacts on the local and regional economy are summarized below in Section 4.6.1.1.

Table 2.6: Refuge Staffing

Position	Number	Grade Level
Project Leader	1	GS-14
Deputy Project Leader	1	GS-13
Wildlife Biologist	2	GS-12, GS-11
Outdoor Recreation/ Outreach Specialist	1	GS-11
Law Enforcement (Supervisory)	1	GS-11
Law Enforcement	4	GS-9
Maintenance Mechanic	1	WG-10
Maintenance Worker	2	WG-8
Budget Administrator	1	GS-7
Office Assistant	1	GS-6

2.5 ALTERNATIVE 4 (PREFERRED ALTERNATIVE): ACTIVE MANAGEMENT

This alternative emphasizes maintaining the refuge's wildlife populations through the continued provision of developed waters. Assumptions central to this alternative's approach include the following. Habitat fragmentation and human development around perennial sources of water have restricted access to alternate sources of water and forage previously used by wide-ranging resident wildlife during times of drought stress on the refuge. Habitat degradation by past overgrazing impacts the quality of forage and increases the density of woody shrubs. Many diseases introduced by domestic livestock persist in refuge wildlife populations. In view of these assumptions, provision of developed waters to refuge wildlife is considered essential to maintaining natural population densities of large, wide-ranging species such as desert bighorn sheep and Sonoran pronghorn. In the context of providing reliable waters for wildlife, the refuge will continue to investigate and implement measures to reduce and eventually eliminate the need to haul water in wilderness. This Alternative is most similar to the No Action Scenario, but offers a more active approach to the achieving the refuge's purposes, goals and objectives.

2.5.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.5.1.1 Endangered and Threatened Species

The refuge will continue to participate in recovery of endangered and threatened species as described above in Section 2.1.1 under Elements Common to All Alternatives, with the following additions.

2.5.1.1.1 Sonoran Pronghorn

2.5.1.1.1.1 Population Monitoring

No change is proposed from that described above in Section 2.1.1.1.1, under Elements Common to all Alternatives.

2.5.1.1.1.2 Developed Waters

Any new developed waters for Sonoran pronghorn that the Sonoran pronghorn recovery team determines to be necessary will be constructed at sites determined by consultation between the refuge and the recovery team.

The refuge will investigate the feasibility of obtaining photovoltaic powered water level sensors with remote transmission capability or other devices for remote water level monitoring. Should such devices be available, and prove effective, they will be installed at each of the developed waters serving Sonoran pronghorn in wilderness, subject to MRA for waters in wilderness. Trips for hauling water will be made only when these sensors indicate that the water remaining would not last until the next seasonal rainy period. This should reduce the number of water hauling trips made to the minimum necessary to keep the developed waters from going dry.

The refuge will implement a program of upgrading existing developed waters in wilderness. The upgrades will increase their water collection efficiency and capacity while decreasing evaporation, visual intrusiveness and maintenance requirements. These improvements should greatly reduce or eliminate the need for hauling supplemental water. The improved waters will include enhanced visual clues of water level, to facilitate accurate determination of the volume of water remaining in each by AGFD staff conducting

weekly aerial reconnaissance of the refuge.

Within three years of the adoption of this CCP the refuge will conduct a comprehensive survey of the pronghorn habitat to identify suitable locations for developing additional pronghorn waters.

Refuge staff will annually collect water samples from all developed water for analysis and detection of potential pathogens and their potential affect on the health of Sonoran pronghorn.

2.5.1.1.1.3 Captive Breeding/Translocation

No change is proposed from that described above in Section 2.1.1.1.3, Elements Common to all Alternatives.

2.5.1.1.1.4 Area Closures

No change is proposed from that described above in Section 2.1.1.1.4, Elements Common to all Alternatives.

2.5.1.1.1.5 Supplemental Feeding and Forage Enhancements

In addition to the forage enhancement plots described above in Section 2.1.1, Elements Common to All Alternatives, the refuge will locate suitable sites for additional forage enhancement areas. Selected sites will be characterized by better than average vegetative cover in areas of documented frequent pronghorn presence.

2.5.1.1.1.6 Fencing

The refuge will work with its partners to develop wildlife corridors to the east across Arizona Highway 85 and north across the BMRG. The refuge will work with BLM to eliminate grazing on adjacent lands and then remove fences.

2.5.1.1.1.7 Predator Management

The refuge will implement studies, including radio collaring, to investigate use of developed waters, size of home range and breeding success of coyote on the refuge. These studies will also include review of data on predation on Sonoran pronghorn collected on BMGR and OPCNM. Predator management may be a necessary component of Sonoran pronghorn recovery.

2.5.1.1.1.8 Habitat Restoration Research

Other than research on use of developed waters and supplemental food sources by Sonoran pronghorn, none is proposed.

2.5.1.1.2 Lesser Long-nosed Bat Conservation

In addition to the protection afforded by the lesser long-nosed bat's maternity roost's remote location and fence around the roost entrance described above in Section 2.1.1.2, under this alternative refuge staff will install a gate over the entrance to the roost if there is any evidence that unauthorized individuals are circumventing the fence and gaining access to the roost. The gate would be locked open during the bat's breeding and rearing season, as juvenile lesser long-nosed bats are poor fliers and are unable to pass through any grate that will prohibit human entry. The gate would contain grates passable by adult lesser-long nosed bat so that any bats that arrive early in the spring while the gate would still be closed can access the roost. When bats are absent during the winter the gate would be locked closed to discourage human use.

The gate should be considered be a "second line of defense" to further deter any habitual users of the roost entrance who devise a method of climbing over or otherwise circumventing the fence. Refuge staff will continue to periodically monitor the roost entrance to document damage caused by human use and assess bat use of the roost. Refuge law enforcement personnel will continue periodic surveillance of the roost entrance to apprehend unauthorized users. Refuge staff will continue to survey for additional, unknown roost sites on the refuge. The refuge will continue to keep the location of the roost unpublished.

2.5.1.1.3 Pierson's Milkvetch Surveys

No change is proposed from that described above in Section 2.1.1.4, Elements Common to all Alternatives.

2.5.1.1.4 Desert Pupfish Refugium

No change is proposed from that described above in Section 2.1.1.5, Elements Common to all Alternatives.

2.5.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.5.1.2.1 Developed Waters

The refuge will implement a program of upgrading existing developed waters in wilderness. The upgrades will increase their water collection efficiency and capacity while decreasing evaporation, visual intrusiveness and maintenance requirements. These improvements should greatly reduce or eliminate the need for hauling supplemental water. The improved waters will be designed with enhanced visual clues to water level, so that Service and AGFD personnel conducting monitoring flights over the refuge can more easily and accurately determine water levels. The improved waters will also be designed to facilitate water drops from helicopters, should that option be desirable. Refuge staff will continue to periodically haul supplemental water to Buck Peak, Halfway, Tuseral, Senita, Bassarisc, North Pinta, Granite, Eagle and Heart Tanks, all located within the wilderness, as well as the Childs Mountain Parabolic Tank, in non-wilderness, on an as-needed basis.

Should the results of the University of Arizona study of sheep water relationship and other research indicate that additional waters would benefit the refuge sheep population, additional waters may be proposed for development. Should any new developed waters be proposed for desert bighorn sheep, the refuge would conduct a detailed habitat evaluation prior to developing the water and closely monitor response of desert bighorn sheep populations to the new developed water. All appropriate environmental compliance for new waters will be obtained should new waters be proposed. Similarly, should study and research results suggest that any currently operating waters are non-beneficial to sheep, the refuge will consider removing such waters. Prior to removal the refuge would experimentally close wildlife access to the water and monitor for adverse impacts to wildlife.

2.5.1.2.2 Forage Enhancement

None is proposed.

2.5.1.2.3 Population Goal

This alternative sets a refuge population goal for desert bighorn sheep of 500 to 700. This population goal was developed through compiling desert bighorn sheep densities, in sheep per square mile, on other ranges

nearby, averaging the densities and applying a target density lower than the average to the refuge sheep habitat area. The resulting population goal is considered quite conservative, based on the best biological judgment of refuge and AGFD staff. It should be noted that the habitats used for comparison in establishing the population goal all contain developed waters, as provision of developed water is central to AGFD's management of desert bighorn sheep. Nearby occupied sheep habitation OPCNM with limited or no developed water was surveyed once for sheep (Henry 1995). This survey found a desert bighorn sheep density of 1.7 animals per square mile of habitat on the Monument, or slightly lower than the 2.0 animals used for the refuge population goal. Henry's estimate is of limited value, however, as it represents only a single year's data with no repetition. Additionally, OPCNM, is considerably wetter than most of the refuge desert bighorn sheep habitat and includes some natural perennial waters, making comparisons between the two areas questionable.

2.5.1.2.4 Predator Management

The refuge will implement studies, including radio collaring, to investigate use of developed waters, size of home range, breeding success, movements of mountain lion on the refuge and mountain lion movement relative to desert bighorn sheep movement. These studies will also include review of data on predation on desert bighorn sheep collected on BMGR and OPCNM.

2.5.1.3 Desert Ecosystem Integrity Monitoring

2.5.1.3.1 Cactus Ferruginous Pygmy-owl Monitoring

The refuge will develop a monitoring protocol to survey potential habitat for the presence of cactus ferruginous Pygmy-owls, and gather natural history information , juvenile dispersal, home breeding range, and habitat use information for the species.

2.5.1.3.2 Migratory Birds

Refuge staff will continue to monitor Le Conte's thrasher nests for reproductive success, renesting attempts and nest site characteristics. The refuge will initiate research on other bird species listed as Birds of Conservation Concern by the Service's Office of Migratory Bird Management, or as indicators of Sonoran Desert health by the Arizona Partners in Flight program. New research will include point counts for loggerhead shrike, Bell's vireo, gray vireo, crissal thrasher, yellow warbler, black-chinned sparrow and sage sparrow; and determination of the age/size class of saguaros used by nesting by Gila woodpecker and glided flicker.

2.5.1.3.3 Reptiles and Amphibians

When standard protocols for reptile surveys have been developed, the refuge will initiate surveys for Gila monster, desert tortoise, chuckwalla, canyon spotted whiptail and rosy boa. Refuge surveys for desert tortoise will be coordinated with the AIDTT to ensure consistency among agencies. The refuge will survey for the presence of flat-tailed horned lizard, an Arizona Special Status Species that has been documented to occur on Marine Corps lands to the west of the refuge. The refuge will continue to survey abundance, distribution and breeding potential of amphibians, especially in developed waters.

2.5.1.3.4 Raptors and Ravens

The refuge will establish and implement protocols for inventory and monitoring of golden eagle, prairie falcon and raven.

2.5.1.3.5 Game Animals

The refuge will implement a population survey program for mule deer to establish accurate estimates of refuge populations.

2.5.1.3.6 Long-term Monitoring

The refuge will continue to monitor vegetation transects established in 2002 to detect changes in the refuge plant community. Additionally, the refuge and the Regional Office remote sensing scientist will implement a change detection analysis program, using aerial photography sampling (i.e., photography will be taken of a random sample of the refuge, as full photographic coverage of the refuge would be too large to effectively analyze). Analysis of photography taken every two years and comparison of photography from different years and archival photography will allow identification of changes in vegetation community composition and density. The data generated by this monitoring project will be tracked to identify existing sources of change, evaluate their causes and importance and suggest management remedies.

2.5.1.3.7 Exotic/Invasive Species

The *Checklist of the Plants of Cabeza Prieta National Wildlife Refuge, Arizona* lists 32 non-native plant species that occur on the refuge (Felger 1998). This list is presented in Appendix E. Three non-native species, fountain grass, buffelgrass and Sahara mustard, have become established at infestation levels on the refuge. These species have the potential to out-compete native species for resources and reduce the density of native flora on the refuge. Sahara mustard is of particular concern as it appears to be infesting the Pinta Sands area, which has supported a native sand dune endemic community considered to be an important food source for Sonoran pronghorn. Refuge staff will continue to be trained to recognize these species and will continue to document any occurrences encountered during field work. The refuge will continue to remove newly discovered occurrences of fountain grass by hand pulling to limit its spread and eliminate new small infestations where feasible. To prevent new infestations to the greatest degree feasible, refuge staff will visually inspect vehicles, clothing and equipment for seeds or other plant propagules prior to entering the refuge. The refuge will attempt to work with the Mexican government to identify means of controlling the spread of exotic plants along Mexican Highway 2.

Trespass livestock present a variety of potential problems to native wildlife on the refuge, including the spread of disease, introduction of invasive plant species competition for forage resources and exclusion of native wildlife from water sources. There are two sources of trespass cattle, a private grazing lease on BLM land to the east of the refuge and occasional cross border trespass from Mexico. Domestic goats from Mexico occasionally cross onto the refuge. Goats are particularly problematic as bot fly hosts. While bot flies are not a troublesome parasite to goats, bot fly larvae cause chronic sinusitis in wild desert bighorn sheep, a debilitating and frequently lethal condition. When livestock are encountered on the refuge, staff will attempt to identify and contact the owner to facilitate removal. If the owner cannot be identified, trespass livestock will be humanely removed. Areas where livestock trespass occurred will be monitored for invasive or exotic plant species.

2.5.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.5.2.1 Minimum Requirements Analysis

The refuge will streamline the MRA process described above in Section 2.1.3.1 under Elements Common to

All Alternatives, Wilderness Stewardship, by establishing programmatic MRAs for all predictable, recurring activities, such as water hauling, wildlife surveys, removal of abandoned vehicles and water sample collection, which require generally prohibited uses of wilderness. These programmatic MRAs will not relieve the refuge of the requirement to conduct activity-specific MRAs in each case of water hauling, vehicle removal or other activities. The process of preparing activity-specific MRAs will be simplified by the existence of programmatic MRAs, in that staff will focus on the unique aspects of each type of activity (e.g., location of vehicle to be removed, season and recent weather for water hauling). Programmatic MRAs for management activities proposed under this alternative are found at Appendix F.

2.5.2.2 Abandoned Vehicles Removal

Abandoned vehicles will continue to be removed as they are found on the refuge wilderness, subject to an MRA. In the case of vehicles abandoned in wilderness, refuge staff will tow the vehicle to the nearest non-wilderness road, typically El Camino del Diablo, using a refuge vehicle. Whenever feasible, the vehicle will be towed along its entry track, thus avoiding new impacts to wilderness. Once removed to a road outside of wilderness, the vehicle will be hauled off of the refuge by a commercial towing company. The refuge will also examine the feasibility entering a memorandum of agreement with adjacent military commands to make heavy-lift military helicopters available for removing abandoned vehicles from refuge wilderness (the refuge examined this technique in 2002 but no military airlift commands were willing to assume the risks involved in removing vehicles at that time). Vehicles abandoned on refuge non-wilderness will also be removed as soon as is feasible, taking care to limit damage to vegetation and the soil surface.

2.5.2.3 Military Debris Removal

Active military debris removal by the refuge will continue to include notification to the military of unexploded ordnance as it is found. The refuge will actively coordinate with the military and volunteers to remove tow darts and tow cable from the refuge, using appropriate means in wilderness to accomplish removal.

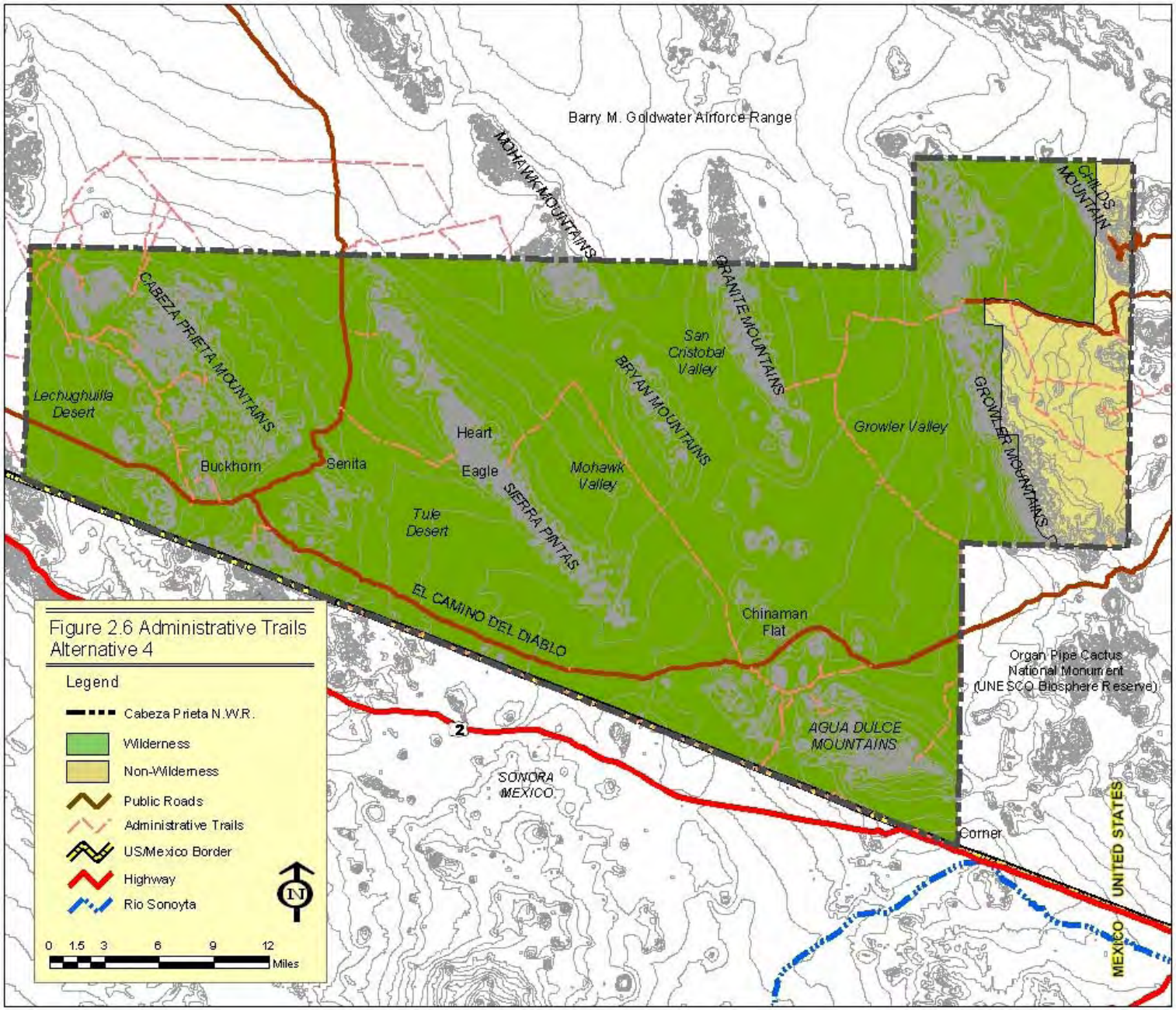
2.5.2.4 Administrative Trails

The refuge will close Monreal Well Trail, Tractor Trail and the Mohawk Trail north of Eagle Tank Trail in the wilderness to management vehicular use (see figure 2.6). These restrictions will end refuge management vehicular use of approximately 32 kilometers (20 miles) of administrative trails previously so used. The trails are closed to management vehicular use, but will remain available to border law enforcement use under the provisions of the Arizona Desert Wilderness Act of 1990. Management use of the administrative trails not closed will continue to require an MRA. Refuge back-country visitors will be encouraged to hike on administrative trails in order to concentrate user impacts on already affected areas.

If future changes in management regime result permanent cessation of all water hauling, all the administrative trails will be closed to refuge management use.

2.5.2.5 Wilderness Impact Monitoring

In addition to continuation of the ongoing wilderness impact monitoring described above in Section 2.1.3.3 under Elements Common to All Alternatives, Wilderness Stewardship, the refuge will work with the Regional Office remote sensing staff to design an aerial photography program to monitor impacts of trail development by undocumented aliens or narcotics traffickers crossing the refuge. Photography flown in 1994 by the Department of Commerce's Borderlands Project can serve as a baseline for comparison. Refuge field staff will identify areas known to be impacted by illegal traffic. This information will be used to identify areas of the refuge to be flown and photographed on a biennial basis.


Barry M. Goldwater Airforce Range
MOHAWK MOUNTAINS
CHILDS MOUNTAIN
CABEZA PRIETA MOUNTAINS
GRANITE MOUNTAINS
San Cristobal Valley
BRYAN MOUNTAINS
GROWLER MOUNTAINS
Growler Valley
Lechuguilla Desert
Heart
Buckhorn
Senita
Eagle
Mohawk Valley
SIERRA PINTAS
Tule Desert
EL CAMINO DEL DIABLO
Chinaman Flat
Organ Pipe Cactus National Monument (UNESCO Biosphere Reserve)
AGUA DULCE MOUNTAINS
SONORA MEXICO
Corner
UNITED STATES
MEXICO
2
Figure 2.6 Administrative Trails Alternative 4
Legend
Cabeza Prieta N.W.R.
Wilderness
Non-Wilderness
Public Roads
Administrative Trails
US/Mexico Border
Highway
Rio Sonoyta
N
0 1.5 3 6 9 12
Miles

Refuge staff will maintain a database of all observed adverse impacts to wilderness, whether caused by refuge management, illegal activities, border law enforcement or visitor use. This and data generated by wilderness impact monitoring will support the research described above in Section 2.1.5.2.

2.5.2.6 Border Law Enforcement

The Refuge will continue to coordinate with border law enforcement agencies described above in Section 2.1.3.2, Elements Common to All Alternatives, Wilderness Stewardship.

2.5.2.7 Licensing Uses of the Childs Mountain Communications Site

The Refuge will continue to allow currently permitted uses of the Childs Mountain site, and will renew permits as deemed necessary for human safety and efficient law enforcement. The refuge will maintain a current inventory of all permitted uses and prevent any increase of the development footprint. The refuge will work with the military to identify any obsolete buildings or other structures on the site and have them removed. At the end of the current use agreement, the refuge will work with the FAA and military to renew the agreement or have the facilities removed, if no longer needed for health, safety and national security.

2.5.3 Goal: Visitor Services Management

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding and protection of the plant, animal and wilderness resources of Cabeza Prieta NWR.

2.5.3.1 Managing Visitor Access

Access to the refuge, other than the Visitor Center, is by permit only. The refuge, the BMGR and BLM will continue to issue joint public access permits. Permits will be available at several locations, including the refuge office and visitor center in Ajo, Luke Air Force Base in Phoenix, Marine Corps Air Station in Yuma, Gila Bend Air Force Auxiliary Field south of Gila Bend and the Bureau of Land Management Office in Phoenix. Upon obtaining the permit, visitors must contact the Auxiliary Air Base by telephone prior to entry and upon exit of BMGR. Visitors to the refuge are required to contact a refuge phone-in number prior to entering the refuge and leave a recorded message with the following information to assist the Fish and Wildlife Service in managing the refuge: permit number for each person in the party, date of entry, destination, length of visit and number of vehicles in the party. There is no requirement to contact the call in upon leaving the refuge. This information is used by the refuge to track numbers of visitors and routes of travel in the refuge. The permit clarifies that leaving this message does not assure search and rescue should the visitors encounter an emergency, but is for informational use only by the refuge. The refuge access permit will continue to serve as a hold harmless agreement protecting the military from any liability if refuge visitors are harmed by military activities or debris. Each recipient of an access permit will also receive an informational packet outlining the rules and regulations for the BMGR and the Refuge. The refuge will coordinate with the military and BLM to ensure that every visitor to the refuge receives Leave No Trace travel and camping information.

El Camino del Diablo and Christmas Pass Road will remain restricted to four-wheel-drive, high clearance vehicles only; Charlie Bell Road will remain restricted to high clearance vehicles only (two-wheel-drive permitted). Vehicle travel will remain restricted to the established roadway, with pull-off and parking allowed in the center 30 meters (100 feet) of the 60 meter (200 foot) non-wilderness travel corridors along el Camino del Diablo and Christmas Pass Road. Only registered, street-legal vehicles will be permitted on the refuge. Motor vehicles and mechanical transport will remain prohibited in designated wilderness. Parties of more than four vehicles traveling together will require a special use permit. Street-legal, registered ATVs and motorcycles will also be allowed on the refuge non-wilderness access roads. Street-legal, registered

ATVs and motorcycles operating on the refuge non-wilderness access roads will be required to be fitted with a mast displaying an orange flag at least 2.4 meters (8 feet) off the ground. The flag's area must equal or exceed 0.5 square meter (80 square inches).

Refuge roads will be closed from March 15 to July 15 each year for Sonoran Pronghorn fawning protection. The beginning date may be moved to March 1st in a severe drought or April 15 during heavy precipitation years with excellent habitat conditions.

Pack and saddle stock will be allowed only by special use permit. Restrictions of the special use permit for pack and saddle stock will include: a maximum of four horses, burros or mules per party; travel only on the administrative trails, dry washes and along the base of the mountain ranges; no grazing on the refuge or use of refuge water holes, tinajas, tanks, etc. to water stock; feed pellets or processed and pelletized feed only while on the refuge and for three days prior to entry; long-term stock camps (more than 2 nights) are permitted only in designated areas: Daniel's Arroyo, Lower Well, Agua Dulce, O'Neil Hills, Christmas Pass, Coyote Wash and Tule Tank (1.6 kilometer [1 mile] east of Tule Well); all surface disturbance at campsites must be restored; and all trash and animal waste must be removed from base camps. All visitors to wilderness will receive orientation information on leave no trace wilderness use techniques

2.5.3.2 Administering Hunt Program

2.5.3.2.1 Desert Bighorn Sheep

The refuge will continue to offer a limited desert bighorn sheep hunt, administered in cooperation with AGFD and allowed under a refuge special use permit (restrictions of the special use permit for hunting include those listed above for saddle and pack stock, as sheep hunters are the primary stock users on the refuge; the special use permit also allows detailed tracking of hunting on the refuge). The tag limit for bighorn has ranged between one and eight permits per year.

2.5.3.2.2 Mule Deer

Should the results of the game animal population surveys indicate that the refuge population mule deer is sufficient to support hunting, and such as hunt is compatible with refuge purposes, the refuge will implement a mule deer hunt. This hunt will be administered by AGFD, subject to Arizona hunting regulations, and will only be implemented upon a determination that the U.S. subpopulation of Sonoran pronghorn has stabilized and would not be jeopardized by such a hunt. Numbers of permits issued for mule deer on the refuge hunt units will be determined using the results of the population survey and considering refuge management goals. Should the refuge implement a mule deer hunt, accommodations for hunters with disabilities will be developed in refuge non-wilderness.

2.5.3.2.3 Small Game

The refuge will consider implementing a small game hunt for quail, dove and rabbit. This hunt will be administered by AGFD, subject to Arizona hunting regulations. The hunt would commence only upon a determination that the U.S. subpopulation of Sonoran pronghorn has stabilized and would not be jeopardized by such a hunt, that the hunt is consistent with refuge management goals, and that the hunt is compatible with the refuge purpose.

2.5.3.2.4 Predators

If determined consistent with refuge management goals and compatible with the refuge purposes, public predator hunts for coyote, bobcat and mountain lion may be authorized on the refuge. These hunts would be administered by AGFD, subject to Arizona hunting regulations, and will only be implemented upon a

determination that the U.S. subpopulation of Sonoran pronghorn has stabilized and would not be jeopardized by such a hunt.

2.5.3.3 Implementing the Leave-No-Trace Program

Leave-No-Trace (LNT) is a set of back-country travel and camping skills aimed at greatly reducing the overall impacts of outdoor recreation. The refuge will continue to provide all permitted back-country users an information packet including LNT information and detailing the generally prohibited uses of wilderness enumerated in the Wilderness Act of 1964. The refuge will continue to make LNT information available to visitors and annually review LNT handouts for accuracy. Visitor contact refuge employees and interested volunteers will be provided annual opportunities to receive LNT training.

2.5.3.4 Provision of Environmental Education

The refuge will continue to respond to requests from local schools for natural history and other environmental education presentations. The refuge will also develop a Sonoran Desert ecosystem-specific environmental education program and associated instructional materials for use by staff in schools and other venues.

2.5.3.5 Interpretation of Environmental Resources

The refuge will develop a trail and overlook, compliant with the Americans with Disabilities Act (ADA), to provide viewing of the desert pupfish refugium. The overlook will be shaded for visitor comfort and will include interpretive materials describing the desert pupfish, its conservation status and the purpose of the refugium.

The refuge will expand the visitor center with additional exhibition, classroom and office space. The visitor center will be staffed seven days a week during the winter season when staffing levels permit. Refuge staff and contractors will develop a new general refuge video an interpretive pamphlet for the existing trail on the visitor site and additional interpretive displays for the visitor center. Refuge staff will lead guided interpretive walks and offer lectures and workshops on Sonoran Desert natural resources at the visitor center.

The refuge will develop additional interpretive signage and overlooks in non-wilderness areas. Pending a determination that Sonoran pronghorn populations have stabilized and that such use would not jeopardize the subspecies, the refuge will investigate the feasibility of developing a road loop in the non-wilderness portion of the Childs Valley in cooperation with BLM.

Should ongoing efforts to acquire a 12-hectare (30-acre) site adjacent to the current refuge visitor center site be successful, the refuge will develop an expanded interpreted trail on that site. The trail would include placarded examples of plant species typical of the refuge's various vegetation communities, and information about their habitat value, wildlife use and any traditional cultural uses of the plant or its seeds and fruits.

The refuge will develop public information, including pamphlets available at the refuge visitor center, regarding the beneficial attributes of bats, such as pollination.

The Childs Mountain Watchable Wildlife site will continue to be open only to guided tours due to safety constraints.

The refuge will continue to provide interpretation of the Sonoran Desert resources each February at the Sonoran Shindig. This is an annual celebration of the Sonoran Desert is cosponsored by the refuge and the Ajo Chamber of Commerce. The Shindig includes cultural activities and displays interpreting the flora and

fauna of the refuge. The refuge will also host open houses during National Wildlife Refuge Week each October.

2.5.3.6 Managing Visitor Camping

Camping is considered necessary to support hunting, wildlife observation and photography, given the remoteness of the refuge, the difficulty of access to much of the refuge and the nocturnal or twilight activity of many desert wildlife species. The refuge will continue to offer both back-country and vehicle accessible camping. The following rules will be enforced to protect refuge resources and maintain wilderness character: camping is prohibited within 400 meters (1/4 mile) of any wildlife water; along the non-wilderness access roads fires are restricted to charcoal and camp stoves, and wood that can be determined by a law enforcement officer to be of non-Sonoran Desert origin (e.g., construction materials, pine, etc.); the maximum length of stay is 14 consecutive days and parties of more than eight campers or four vehicles will require a special use permit (Monz *et al.* 2000, provide a discussion of the reasons to limit party size in wilderness). Three developed, vehicle accessible primitive camping areas with minimal amenities will be retained at Papago Well, Tule Well and Christmas Pass. In the refuge backcountry (i. e., areas away from the non-wilderness access roads, which are reached by backpacking) campers may collect dead and down wood for campfires.

2.5.3.7 Pack and Saddle Stock Restrictions

Continued control of pack and saddle stock, through the requirement of a special use permit, is appropriate due to the much greater impacts on campsites and trails caused by pack and saddle stock versus hikers (Spildie *et al.* 2000). Pack and saddle stock will be limited to horses, burros and mules. There are five designated stock camps along the refuge public access roads.

2.5.4 Goal: Cultural Resources Management

Protect, maintain and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations.

2.5.4.1 General Provisions

The general provisions for achieving this goal are addressed as described above in Section 2.1.4 under Elements Common to All Alternatives.

2.5.4.2 Onsite Interpretation

The refuge will develop panels interpreting the early history of Ajo with placards on the refuse heaps on the visitor center site.

2.5.4.3 Site Stabilization/Patrols

Refuge staff will periodically inspect known sites for damage and develop stabilization measures if needed. Refuge law enforcement staff will periodically patrol known sites to apprehend unauthorized individuals and discourage unauthorized entry.

2.5.4.4. Inventory

The refuge will not conduct any inventory of cultural resources.

2.5.4.5 Training

The refuge will provide training to border law enforcement staff regarding the sensitivity of refuge cultural resources and avoidance of damage to cultural resources during border law enforcement operations.

2.5.5 Staffing

In order to implement this management alternative, the refuge will need to add three full time positions beyond the level of the no-action scenario. These positions, one wildlife biologist (GS-11), one maintenance worker (WG-8), and one law enforcement officer, reflect increased wildlife monitoring and law enforcement efforts. The required staffing level summarized in Table 2.7. The cost of implementing this staffing level, and its impacts on the local and regional economy are summarized below in Section 4.6.1.1.

Table 2.7: Refuge Staffing

Position	Number	Grade Level
Project Leader	1	GS-14
Deputy Project Leader	1	GS-13
Refuge Operations Specialist	1	GS-11
Wildlife Biologist	2	GS-12, GS-11
Outdoor Recreation/ Outreach Specialist	1	GS-12
Law Enforcement (Supervisory)	1	GS-11
Law Enforcement	4	GS-9
Maintenance Worker	3	WG-10, WG-8
Budget Administrator	1	GS-7
Office Assistant	1	GS-6

2.6 ALTERNATIVE 5: MAXIMUM EFFORT

This alternative emphasizes active management aimed at increasing the size of the refuge desert bighorn sheep population and also enhancing the refuge visitor experience. An assumption basic to this alternative is that desert bighorn abundance was historically much greater in the region prior to habitat fragmentation, groundwater withdrawals, surface water diversion, over hunting and the introduction of diseases carried by domestic livestock. In view of this assumption, a population goal established for desert bighorn sheep reflects the densities observed in the better stocked existing habitats with developed water sources in the region today. This density is considered a component of refuge wilderness character.

2.6.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.6.1.1 Endangered and Threatened Species

The refuge will continue to participate in recovery of endangered and threatened species as described above in Section 2.1.1 under Elements Common to All Alternatives, with the following additions.

2.6.1.1.1 Sonoran Pronghorn

2.6.1.1.1.1 Population Monitoring

The frequency of the population surveys described above in Section 2.1.1.1.1 under Elements Common to All Alternatives, will be increased to yearly surveys.

2.6.1.1.1.2 Developed Waters

The refuge will investigate the feasibility of obtaining photovoltaic powered water level sensors with remote transmission capability or other devices for remote water level monitoring. Should such devices be available they will be installed at each of the developed waters serving Sonoran pronghorn in wilderness, subject to MRA for waters in wilderness. Trips for hauling water will be made only when these sensors indicate that less than one week's supply of water remains. This should reduce the number of water hauling trips made to the minimum necessary to keep the developed waters from going dry.

The refuge will implement a program of upgrading existing developed waters in wilderness. The upgrades will increase their water collection efficiency and capacity while decreasing evaporation, visual intrusiveness and maintenance requirements. These improvements should greatly reduce or eliminate the need for hauling supplemental water.

Within three years of the adoption of this CCP the refuge will conduct a comprehensive survey of the pronghorn habitat to identify suitable locations for developing additional pronghorn waters.

Refuge staff will annually collect water samples from all developed water for analysis and detection of potential pathogens and their potential affect on the health of Sonoran pronghorn.

2.6.1.1.1.3 Captive Breeding/Translocation

No change is proposed from that described above in Section 2.1.1.1.3, Elements Common to all Alternatives.

2.6.1.1.1.4 Area Closures

No change is proposed from that described above in Section 2.1.1.1.4, Elements Common to all Alternatives.

2.6.1.1.1.5 Supplemental Feeding and Forage Enhancement

In addition to the forage enhancement plots described above in Section 2.1.1, Elements Common to All Alternatives, the refuge will locate suitable sites for additional forage enhancement areas. Selected sites will be characterized by better than average vegetative cover in areas of documented frequent pronghorn presence.

2.6.1.1.1.6 Fencing

The refuge will work with its partners to develop wildlife corridors to the east across Arizona Highway 85 and north across the BMRG. The refuge will work with BLM to eliminate grazing on adjacent lands and then remove fences.

2.6.1.1.1.7 Predator Management

The refuge will implement studies, including radio collaring, to investigate use of developed waters, size of home range and breeding success of coyote on the refuge. These studies will also include review of data on predation on Sonoran pronghorn collected on BMGR and OPCNM. Selective removal of coyotes will be implemented when the Sonoran pronghorn population is below 100 animals and winter and spring precipitation is 50 percent or less of average.

2.6.1.1.1.8 Habitat Restoration Research

Other than research on use of developed waters and supplemental food sources by Sonoran pronghorn, none is proposed.

2.6.1.1.2 Lesser Long-nosed Bat Conservation

In addition to the protection afforded by the lesser long-nosed bat's maternity roost's remote location and fence around the roost entrance described above in Section 2.1.1.2, under this alternative refuge staff will install a gate over the entrance to the roost, is there is any evidence that unauthorized persons are circumventing the fence. The gate will be locked open during the bat's breeding and rearing season, as juvenile lesser long-nosed bats are poor fliers and are unable to pass through any grate that will prohibit human entry. The gate will contain grates passable by adult lesser-long nosed bat so that any bats that arrive early in the spring while the gate is still closed can access the roost. When bats are absent during the winter the gate will be locked closed to disrupt of human use. The gate should be considered be a "second line of defense" to further deter any habitual users of the roost entrance who devise a method of climbing over or otherwise circumventing the fence. Refuge staff will continue to periodically monitor the roost entrance to document damage caused by human use and assess bat use of the roost. Refuge law enforcement personnel will continue periodic surveillance of the roost entrance to apprehend unauthorized users. Refuge staff will continue to survey for additional, unknown roost sites on the refuge. The refuge will continue to keep the location of the roost unpublished.

2.6.1.1.3 Pierson's Milkvetch Surveys

No change is proposed from that described above in Section 2.1.1.4, Elements Common to all Alternatives.

2.6.1.1.4 Desert Pupfish Refugium

No change is proposed from that described above in Section 2.1.1.5, Elements Common to all Alternatives.

2.6.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.6.1.2.1 Developed Waters

The refuge will implement a program of upgrading existing desert bighorn sheep developed waters in wilderness. The upgrades will increase their water collection efficiency and capacity while decreasing evaporation, visual intrusiveness and maintenance requirements. These improvements should greatly reduce or eliminate the need for hauling supplemental water. The improved waters will be designed with enhanced visual clues to water level, so that Service and AGFD personnel conducting monitoring flights over the refuge can more easily and accurately determine water levels.

Refuge staff will continue to periodically haul supplemental water to Buck Peak, Halfway, Tuseral, Bassarisc, North Pinta, Granite, Heart and Eagle Tanks, all located within the wilderness, as well as the Childs Mountain Parabolic Tank, in non-wilderness.

The refuge will investigate the feasibility of obtaining photovoltaic powered water level sensors with remote transmission capability or other devices for remote water level monitoring. Should such devices be available they will be installed at all waters retained. When these sensors indicate that water supplies insufficient to last until the next anticipated rainy season remain, supplemental water will be hauled to the developed water. These sensors should reduce the number of water hauling trips made to the minimum necessary to keep the waters from going dry.

Within one year of CCP adoption, the refuge will complete a comprehensive survey of desert bighorn sheep habitat to identify suitable sites for additional high collection and retention efficiency, low visual impact developed waters. Sites for new developed waters in the northern Granite Mountains and throughout the Growler Mountains are particularly desirable, as these ranges are considered under supplied with water for optimum desert bighorn sheep population increase on the refuge (Morgart 2002). Developed waters will be constructed subject to MRA, using both refuge staff and volunteer labor.

2.6.1.2.2 Forage Enhancements

During the refuge-wide survey of desert bighorn sheep habitat for potential developed water sites, the refuge will also search for valleys or canyons in the mountain ranges that would be suitable as forage enhancement areas. In wilderness potential forage enhancement sites would be achieved by subtly redirecting runoff from adjacent slopes to concentrate flows into the site and construction of small check dams along the valley bottom to capture runoff, increase water residence time, and increase infiltration. In non-wilderness areas forage enhancement may be achieved by irrigation of the valley or canyon using water from a well. Supplemental water in these sites will foster growth of grasses and forbs, and has the potential to greatly increase the area's carrying capacity for desert bighorn sheep (J. Hervert, AGFD, pers. comm.).

2.6.1.2.3 Population Goal

This alternative sets a refuge population goal for desert bighorn sheep of 900 to 1200. This goal is based upon comparison of sheep densities in the more densely stocked similar habitats off-refuge. It represents a sustainable population for the refuge, in the best professional judgment of refuge staff, given additional developed waters and forage enhancements. If 75 percent of this goal is not achieved within 15 years of plan adoption, the refuge will seek off-site stock for stocking of refuge mountain ranges.

2.6.1.2.4 Predator Management

Within two years of CCP adoption the refuge will implement studies, including radio collaring, to investigate use of developed waters, size of home range and breeding success of mountain lion on the refuge. Studies will also include review of data on predation on desert bighorn sheep collected on BMGR and OPCNM. If studies determine that predation is adversely affecting desert bighorn population numbers, the refuge will implement limited predator controls, including a public predator hunt coordinated by AGFD, consistent with MRA and Sonoran pronghorn conservation.

2.6.1.3 Desert Ecosystem Integrity Monitoring

2.6.1.3.1 Cactus Ferruginous Pygmy-owl Monitoring

The refuge will develop a monitoring protocol to survey potential habitat for the presence of cactus ferruginous Pygmy-owls, and gather natural history information, juvenile dispersal, home breeding range and habitat use information for the species.

2.6.1.3.2 Migratory Birds

Refuge staff will continue monitor Le Conte's thrasher nests for reproductive success, renesting attempts and nest site characteristics. Le Conte's thrasher is listed by the Arizona Partners in Flight program as an indicator of Sonoran Desert health. The refuge will initiate research on other bird species listed as Birds of Conservation Concern by the Service's Office of Migratory Bird Management, or as indicators of Sonoran Desert health by the Arizona Partners in Flight program. New research will include distribution and status surveys for elf owl, Gila woodpecker, gilded flicker, loggerhead shrike, Bell's vireo, gray vireo, crissal thrasher, black-chinned sparrow and sage sparrow; point counts for yellow warbler; determination of the age/size class of saguaros used by nesting Gila wood pecker and glided flicker; and study of habitat use by black-chinned sparrow, sage sparrow and Costa's hummingbird. and investigation of natural history, juvenile dispersal.

2.6.1.3.3 Reptiles and Amphibians

The refuge will develop standard protocols for reptile surveys and implement additional surveys, contracting with the University of Arizona for staff. When the protocols are in place, the refuge will initiate surveys for Gila monster, desert tortoise, chuckwalla, canyon spotted whiptail, flat tailed horned lizard and rosy boa. Refuge surveys for desert tortoise will be coordinated with the AIDTT to ensure consistency among agencies The refuge will continue to survey abundance, distribution and breeding potential of amphibians, especially in developed waters.

2.6.1.3.4 Raptors and Ravens

The refuge will establish and implement protocols for inventory and monitoring of golden eagle, prairie falcon and raven.

2.6.1.3.5 Game Animal

The refuge will implement a population survey program for mule deer, quail, dove and rabbit to establish accurate estimates of refuge populations.

2.6.1.3.6 Long-term Monitoring

Within four years of CCP adoption, the refuge will complete a survey of critical desert resources, refuge-wide. Resources to be surveyed include natural water sources, invasive species infestations, areas of high forage value for desert bighorn sheep or Sonoran pronghorn and mineral licks used by wildlife. Refuge staff will document the locations of surveyed resources using global positioning system equipment to allow efficient, accurate mapping.

The refuge will continue to monitor vegetation transects established in 2002 to detect changes in the refuge plant community. Additionally, the refuge and the regional office will implement a change detection analysis, using aerial photography sampling (i.e., photography will be taken of a random sample of the refuge, as full photographic coverage of the refuge would be too large to effectively analyze). Analysis of photography taken each year and comparison of photography from different years and archival photography will allow identification of changes in vegetation community composition and density.

2.6.1.3.7 Exotic/Invasive Species

The *Checklist of the Plants of Cabeza Prieta National Wildlife Refuge, Arizona* lists 32 non-native plant species that occur on the refuge (Felger 1998). This list is presented in Appendix E. Three non-native species, fountain grass, buffelgrass and Sahara mustard, have become established at infestation levels on the refuge. These species have the potential to out-compete native species for resources and reduce the density of native flora on the refuge. Sahara mustard is of particular concern as it appears to be infesting the Pinta Sands area, which has supported a native grass community considered to be an important food source for Sonoran pronghorn. In consultation with the regional Exotic/Invasive Species Coordinator, the refuge has modeled likely locations of occurrence for each species. Refuge staff will continue to be trained to recognize these species and document any occurrences encountered during field work. Additionally, new infestations of exotic and invasive plants should be identified during the refuge-wide survey described in Section 2.6.1.3.6 above. The refuge will continue to actively manage fountain grass by hand pulling to limit its spread and eradicate small infestations where feasible. As new occurrences of exotic/invasive species are identified, refuge staff will eradicate by hand pulling, burning or chemical treatment, as appropriate, subject to MRA in wilderness.

Trespass livestock present a variety of potential problems to native wildlife on the refuge, including the spread of disease, competition for forage resources and exclusion of native wildlife from water sources. There are two sources of trespass cattle, a private grazing lease on BLM land to the east of the refuge and occasional cross border trespass from Mexico. Domestic goats from Mexico occasionally cross onto the refuge. Goats are particularly problematic as bot fly hosts. While bot flies are not a troublesome parasite to goats, bot fly larvae cause chronic sinusitis in wild desert bighorn sheep, a debilitating and frequently lethal condition. When livestock are encountered on the refuge, staff will attempt to identify and contact the owner to facilitate removal. If the owner cannot be identified, trespass livestock will be humanely removed.

2.6.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.6.2.1 Minimum Requirements Analysis

The refuge will streamline the MRA process described above in Section 2.1.3.1 under Elements Common to All Alternatives, Wilderness Stewardship, by establishing programmatic MRAs for all predictable, recurring activities, such as water hauling, wildlife surveys and water sample collection, which require generally prohibited uses of wilderness. The only case-by-case MRAs anticipated are those covering unpredictable, one-time or very intermittent activities requiring generally prohibited uses in wilderness.

2.6.2.2 Abandoned Vehicles Removal

Abandoned vehicles will continue to be removed as they are found in the refuge wilderness, subject to an MRA. Refuge staff will tow the vehicle to the nearest non-wilderness road, typically El Camino del Diablo, using a refuge vehicle. Whenever feasible, the vehicle will be towed along its entry track, thus avoiding new impacts to wilderness. Once removed to a road outside of wilderness, the vehicle will be hauled off of the refuge by a commercial towing company. The refuge will also examine the feasibility entering a memorandum of agreement with adjacent military commands to make heavy lift military helicopters available for removing abandoned vehicles from refuge wilderness (the refuge examined this technique in 2002 but no military airlift commands were willing to assume the risks involved in removing vehicles at that time). Vehicles abandoned on refuge non-wilderness will also be removed as soon as is feasible, taking care to limit damage to vegetation and the soil surface. All abandoned vehicles will be removed from refuge wilderness within 72 hours of their discovery.

2.6.2.3 Military Debris Removal

Military debris removal by the refuge will continue to include notification to the military of unexploded ordnance as it is found. The refuge will actively coordinate with the military and volunteers to remove tow darts and tow cable from the refuge, using appropriate means in wilderness to accomplish removal. The refuge will set a goal of removing at least 15 military tow darts each year.

2.6.2.4 Administrative Trails

The refuge will retain all administrative trails currently available for management vehicular use (as shown on figure 2.3). Vehicular access to the trails will be limited to border law enforcement under the provisions of the Arizona Desert Wilderness Act of 1990 and refuge management actions subject to MRA. Refuge back-country visitors will be encouraged to hike on administrative trails in order to concentrate user impacts on already affected areas.

If future changes in management regime result permanent cessation of all water hauling, all the administrative trails will be closed to refuge management use.

2.6.2.5 Wilderness Impact Monitoring

In addition to continuation of the ongoing wilderness impact monitoring described above in Section 2.1.3.3 under Elements Common to All Alternatives, Wilderness Stewardship, the refuge will work with the Regional Office remote sensing staff to design an aerial photography program to monitor impacts of trail development by undocumented aliens or narcotics traffickers crossing the refuge. Photography flown in 1994 by the Department of Commerce's Borderlands Project can serve as a baseline for comparison. Refuge field staff will identify areas known to be impacted by illegal traffic. This information will be used to identify areas of the refuge to be flown and photographed on a biennial basis.

Refuge staff will maintain a database of all observed adverse impacts to wilderness, whether caused by refuge management, illegal activities, border law enforcement or visitor use. These data and those

generated by wilderness impact monitoring will support the wilderness research described above in Section 2.1.5.2.

2.6.2.6 Border Law Enforcement

The Refuge will continue to coordinate with border law enforcement agencies described above in Section 2.1.3.2, Elements Common to All Alternatives, Wilderness Stewardship.

2.6.2.7 Licensing of Uses of the Childs Mountain Communications Site

The Refuge will continue to allow currently permitted uses of the Childs Mountain site and will renew permits as deemed necessary for human safety and efficient law enforcement. The refuge will maintain a current inventory of permitted uses and limit any increase of the development footprint that is not necessary in the interest of national security, local law enforcement or human health and safety. The refuge will work with the military to identify any obsolete buildings or other structures on the site and have them removed.

2.6.3 Goal: Visitor Services

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding and protection of the plant, animal and wilderness resources of Cabeza Prieta NWR.

2.6.3.1 Managing Visitor Access

Access to the refuge, other than the Visitor Center, is by permit only. The refuge, pending cooperation with NPS and USMC, will develop a telephone or internet accessible refuge entry permit in addition to the permit currently issued at the visitor center. Concurrence from NPS and USMC is necessary for visitors planning a through trip on El Camino del Diablo, as access to the refuge is through OPCNM on the east and a portion of the BMGR administered by the USMC on the west. If established, this permit would provide full access to the refuge and transit-only access to National Park Service and USMC lands via El Camino del Diablo.

Vehicular access restrictions will continue to limit access to Christmas Pass Road and El Camino del Diablo to four-wheel-drive vehicles, ATVs and motorcycles licensed for roadway use and fitted with a mast displaying an orange flag at least 2.4 meters (8 feet) off the ground. The flag's area must equal or exceed 0.5 square meter (80 square inches). While vehicular travel will be limited to the actual roadway, the entire 60 meter (200 foot) width of the non-wilderness corridor will be open to pull-off and parking. Pending a determination that Sonoran pronghorn populations have stabilized and that such use would not jeopardize the subspecies, the refuge will investigate the feasibility of developing a road loop in the non-wilderness portion of the Childs Valley in cooperation with BLM. Both this road loop and Charlie Bell Road will be maintained to a standard allowing use of ordinary passenger cars at low speed.

2.6.3.2 Administering Hunt Program

2.6.3.2.1 Desert Bighorn Sheep

The refuge will continue to offer a limited desert bighorn sheep hunt, administered in cooperation with AGFD and allowed under a refuge special use permit.

2.6.3.2.2 Mule Deer

Should the results of the game animal population surveys indicate that the refuge deer population is sufficient to support hunting, the refuge will implement a mule deer hunt. This hunt will be administered by AGFD, subject to Arizona hunting regulations, and will only be implemented upon a determination that the U.S. subpopulation of Sonoran pronghorn has stabilized and would not be jeopardized by such hunts. Numbers of permits issued for mule deer on the refuge hunt units will be determined using the results of population surveys and refuge management goals. Should the refuge implement a mule deer hunt, accommodations for hunters with disabilities will be developed in refuge non-wilderness.

2.6.3.2.3 Small Game

The refuge will consider implementing a small game hunt for quail, dove and rabbit. This hunt will be administered by AGFD, subject to Arizona hunting regulations. Hunting will commence only upon determination that the U.S. subpopulation of Sonoran pronghorn has stabilized and would not be jeopardized by such hunts, that the hunt is consistent with refuge management goals, and that the hunt is compatible with the refuge purpose.

2.6.3.2.4 Predators

If determined consistent with refuge management goals and compatible with the refuge purposes, public predator hunts for coyote, bobcat and mountain lion may be authorized on the refuge. These hunts will be administered by AGFD, subject to Arizona hunting regulations, and will only be implemented upon a determination that the U.S. subpopulation of Sonoran pronghorn has stabilized and would not be jeopardized by such a hunt.

2.6.3.3 Implementing Leave-No-Trace Program

Leave-No-Trace (LNT) is a set of back county travel and camping skills aimed at greatly reducing the overall impacts of outdoor recreation. The refuge provides all permitted back-country users an information packet including LNT information and detailing the generally prohibited uses of wilderness enumerated in the Wilderness Act of 1964. The refuge will continue to provide LNT information to all permitted visitors. All visitor contact refuge employees and interested volunteers will be provided annual opportunities for LNT training .

2.6.3.4 Provision of Environmental Education

The refuge will continue to respond to requests from local schools for natural history and other environmental education presentations. The refuge will also develop a Sonoran Desert ecosystem-specific environmental education program for use by staff in schools and other venues. The refuge will conduct teacher workshops on Sonoran Desert education.

2.6.3.5 Interpretation of Natural Resources

The refuge will develop an ADA compliant trail and overlook to provide viewing of the desert pupfish refugium. The overlook will be shaded for visitor comfort and will include interpretive materials describing the desert pupfish, its conservation status and the purpose of the refugium.

The refuge will expand the visitor center with additional exhibition, classroom and office space. The visitor center will be staffed seven days a week during the winter season. Refuge staff and contractors will develop a new general refuge video an interpretive pamphlet for the existing trail on the visitor site and additional interpretive displays for the visitor center. Refuge staff will lead guided interpretive walks and offer

lectures and workshops on Sonoran Desert natural resources at the visitor center.

Should ongoing efforts to acquire a 12-hectare (30-acre) site adjacent to the current refuge visitor center site be successful, the refuge will develop an expanded interpreted trail on that site. The trail would include placarded examples of plant species typical of the refuge's various vegetation communities, and information about their habitat value, wildlife use and any traditional cultural uses of the plant or its seeds and fruits.

The refuge will develop additional interpretive signage and overlooks in non-wilderness areas. Pending a determination that Sonoran pronghorn populations have stabilized and that such use would not jeopardize the subspecies. Should the refuge develop a road loop in non-wilderness in cooperation with BLM, the road will include vistas, interpretive panels at vehicle pull-offs and a self-guided tour with pamphlets available at self-service boxes at the road entrance.

The refuge will continue to participate in the Sonoran Shindig, National Wildlife Refuge Week observances and other festivals.

The refuge will work with the FAA, military and other lessees of the Childs Mountain site to secure their immediate site boundary and attempt to upgrade the road to Arizona Department of Transportation safety standards, so that the Childs Mountain watchable wildlife site can be opened to general use.

2.6.3.6 Managing Visitor Camping

Camping is considered necessary to support hunting, wildlife observation and photography, given the remoteness of the refuge, the difficulty of access to much of the refuge and the nocturnal or twilight activity of many desert wildlife species. The refuge offers both back-country and vehicle accessible camping. The following rules will be enforced to protect refuge resources and maintain wilderness character. Camping will remain prohibited within 400 meters (1/4 mile) of any wildlife water; gathering dead and down wood will be allowed, and the maximum length of stay will remain 14 consecutive days. The three developed, vehicle accessible, primitive camping areas with minimal amenities at Papago Well, Tule Well and Christmas Pass will be retained. Two additional primitive campsites will be developed on Charlie Bell Road and along the Daniels Arroyo Road, both in refuge non-wilderness, pending a determination that neither campsite would jeopardize the continued existence of Sonoran pronghorn.

2.6.3.7 Pack and Saddle Stock Restrictions

Pack and saddle stock will be permitted under the general access permit, with the following restrictions aimed at protecting refuge resources. Travel will be limited to the administrative trails, dry washes and along the base of the mountain ranges; pack and saddle stock will not be allowed to graze on refuge or be watered in any refuge water holes, tinajas or tanks; certified weed-free feed will be used (feed pellets or processed and pelletized feed) on the refuge and for three days prior to entry to prevent introduction of exotic species seeds in manure and no species known or suspected to carry diseases pathogenic to desert bighorn sheep or Sonoran pronghorn will be permitted on the refuge.

2.6.4 Goal: Cultural Resources Management

Protect, maintain and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations.

2.6.4.1 General Provisions

This goal is addressed as described above in Section 2.1.4 under Elements Common to All Alternatives.

2.6.4.2 Onsite Interpretation

Refuge staff will develop panels interpreting the early history of Ajo with placards on the refuse heaps on the visitor center site. The refuge will develop a general history tour that will interpret non-sensitive cultural and historic resources.

2.6.4.3 Site Stabilization/Patrols

Refuge staff will periodically inspect known sites for damage, and develop stabilization measures if needed. Refuge law enforcement staff will periodically patrol known sites to apprehend unauthorized individuals and discourage unauthorized entry.

2.6.4.4 Inventory

Refuge staff will work with the State Historic Preservation Office and the Tohono O'odham Tribe to investigate known or suspected undocumented cultural sites. Additionally, some cultural resource sites are likely to be discovered during the refuge-wide survey for critical desert resources described in Section 2.6.1.5 above.

2.6.4.5 Training

The refuge will provide training to border law enforcement personnel regarding the sensitivity of refuge cultural resources and avoiding damage to cultural resource during border law enforcement operations.

2.6.5 Staffing

In order to implement this management alternative, the refuge will need to add five full time positions beyond the level of the no-action scenario. These positions, two wildlife biologists, one maintenance worker, one law enforcement officer and one outdoor recreation planner, reflect increased wildlife monitoring, law enforcement and visitor services efforts. The required staffing level is summarized in Table 2.8. The cost of implementing this staffing level and its impacts on the local and regional economy are summarized below in Section 4.6.1.1.

Table 2.8: Refuge Staffing

Position	Number	Grade Level
Project Leader	1	GS-14
Deputy Project Leader	1	GS-13
Wildlife Biologist	4	GS-12, GS-11, GS- 9
Outdoor Recreation/ Outreach Specialist	2	GS-12, GS-9
Law Enforcement (Supervisory)	1	GS-11
Law Enforcement	4	GS-9
Maintenance Worker	3	WG-10
Office Assistant	1	GS-5

Table 2.9: Summary comparison of the management alternatives organized by planning issues identified in scoping (Section 1.12)					
Issue	**Alternative 1, No Action**	**Alternative 2**	**Alternative 3**	**Alternative 4 Preferred alternative**	**Alternative 5**
Wildlife & Habitat Management					
Managing Healthy Ecosystems	Climate monitoring Some wildlife monitoring Buffelgrass and trespass livestock control	Same as No Action	Same as No Action plus additional wildlife monitoring, remote sensed change detection analysis, development of wild plant nursery	Same as No Action plus additional wildlife monitoring, beyond that of Alternative 3, remote sensed change detection analysis.	Same as No Action plus greatest intensity of wildlife monitoring of any alternative, remote sensed change detection analysis
Endangered Species	Implement Sonoran pronghorn recovery, Protect lesser long nosed bat roost with fence	Same as No Action	Same as No Action, except that water is supplied to charcos only during extreme drought	Same as No Action, plus installation of a gate at entrance to lesser long nosed bat roost if unauthorized access becomes a problem.	Same as Alternative 4 program plus annual Sonoran pronghorn population surveys.
Desert Bighorn Sheep	Population surveys every three years 15 developed waters maintained and supplied Study of sheep water use No numerical population goal Annual hunts	Population surveys every three years 14 developed waters in wilderness dismantled Study of sheep water use Population goal of 100-200 sheep No hunts	Population surveys every three years Developed waters supplied only during extreme drought Sheep water use study Population goal of 250 to 300 sheep No hunts during drought years	Population surveys every three years 15 developed waters maintained, supplied and upgraded Sheep water use study Population goal of 500 to 700 sheep Annual hunts	Population surveys every three years Developed waters maintained, supplied, upgraded and supplemented Sheep water use study Population goal of 900 to 1,200 sheep Annual hunts

Table 2.9: Summary comparison of the management alternatives organized by planning issues identified in scoping (continued)					
Issue	**Alternative 1, No Action**	**Alternative 2**	**Alternative 3**	**Alternative 4 Preferred alternative**	**Alternative 5**
Predators	Coyote control as prescribed by Sonoran pronghorn recovery plan	Same as No Action	Same as No Action, plus collaring studies of coyote and mountain lion	Same as Alternative 3 plus control of mountain lions if studies indicate	Same as Alternative 4
Wilderness Stewardship					
Wildlife Management in wilderness	Maintenance of, and water supply to, 14 desert bighorn sheep waters, 20 Sonoran pronghorn waters, 2 dual-species waters Capture and collar of Sonoran pronghorn when conditions allow	Maintenance of, and water supply to only the 20 waters serving Sonoran pronghorn No capture and collar of Sonoran pronghorn in wilderness Structural improvements to other developed waters removed	Same as Alternative 2 except that water supplied to desert bighorn sheep developed waters during extreme drought Water supplied to 2 charcos in Sonoran pronghorn habitat only during extreme drought	Same as No Action, plus improvement of developed waters to require less maintenance/ water hauling, and better blend visually into surroundings Possible development of additional waters, should research validate their need	Same as Alternative 4 plus development of additional desert bighorn sheep waters and forage enhancements for desert bighorn sheep

Table 2.9: Summary comparison of the management alternatives organized by planning issues identified in scoping (continued)					
Issue	**Alternative 1, No Action**	**Alternative 2**	**Alternative 3**	**Alternative 4 Preferred alternative**	**Alternative 5**
Wilderness Character Restoration/protection	234 km (145 mi) of administrative trails open to management vehicular use, Abandoned vehicles removed as discovered Annual monitoring of 10 wilderness sites for impacts	137 km (85 mi) of administrative trails open to management vehicular use, Abandoned vehicles removed as discovered Annual monitoring of 10 wilderness sites for impacts, results tracked on database	202 km (125 mi) of administrative trails open to management vehicular use, Abandoned vehicles removed as discovered Annual monitoring of 10 wilderness sites for impacts, biennial analysis of aerial photos to quantify trail development, all results tracked on database	202 km (125 mi) of administrative trails open to management vehicular use, Abandoned vehicles removed as discovered Annual monitoring of 10 wilderness sites for impacts, biennial analysis of aerial photos to quantify trail development, all results tracked on database	Same as Alternative 1 plus biennial analysis of aerial photos to quantify trail development, all results tracked on database
Wildlife Dependent Visitor Services					
Wilderness recreation	Camping and hiking encouraged, charcoal fires and stoves only 14 day length of stay limit (LSL) Pack/Saddle stock requires special use permit (SUP)	Camping and hiking encouraged, charcoal fires and stoves only 8 person party size and 7 dayLSL Pack/Saddle stock not allowed	Camping and hiking encouraged, charcoal fires and stoves only 8 person party size and 7 day LSL Pack/Saddle stock requires SUP	Camping and hiking encouraged, carried-in, non-native firewood allowed, at vehicle camps, dead/ down firewood allowed in backcountry 4 vehicle party size, 8 person party size and 14 day LSL Pack/Saddle stock requires SUP	Camping and hiking encouraged, gathering dead/downed firewood allowed No party size restrictions, 14 day LSL Pack/Saddle stock allowed with general entry permit

Table 2.9: Summary comparison of the management alternatives organized by planning issues identified in scoping (continued)					
Issue	**Alternative 1, No Action**	**Alternative 2**	**Alternative 3**	**Alternative 4 Preferred alternative**	**Alternative 5**
Permitting & Access	Joint entry permit with BMGR, BLM	Same as No Action	Same as No Action	Same as No Action	Refuge only permit, accessible by telephone or internet
Motorized Access in Non-wilderness	Driving allowed only on roadway, pull-offs allowed on center 30 m (100 ft) of road corridors Registered, street-legal vehicles only 4WD required on El Camino del Diablo and Christmas Road, high clearance on Charlie Bell Road	Same as No Action	Same as No Action	Same as No Acton, plus licensed, street-legal motorcycles and ATVs allowed on refuge. Motorcycles and ATVs must carry a visibility flag (see text) Road loop developed in Childs Valley non-wilderness when Sonoran pronghorn population stabilized	Driving only on roadway, pull-offs anywhere within road corridors Copper Canyon Road loop developed with BLM if feasible 4WD required on El Camino del Diablo, Charlie Bell and Copper Canyon Roads maintained for standard passenger cars ATVs and motorcycles allowed
Hunting	Annual desert bighorn sheep hunt	No hunting	Annual desert bighorn sheep hunt, prohibited during extreme drought years	Annual desert bighorn sheep hunt Possible mule deer, small game, & predator hunts (pending Sonoran pronghorn population stability & compatibility determination)	Same as Alternative 4

Table 2.9: Summary comparison of the management alternatives organized by planning issues identified in scoping (continued)					
Issue	**Alternative 1, No Action**	**Alternative 2**	**Alternative 3**	**Alternative 4 Preferred alternative**	**Alternative 5**
Environmental Education and Interpretation	Interpretive materials at visitor center and Childs Mountain Watchable Wildlife Site Sonoran Shindig	Same as No Action	Same as No Action, plus Sonoran Desert specific education program for school use New refuge video Carhart Center wilderness video available for viewing at visitor center Material interpreting importance of bats as pollinators Additional interpretive signs in non-wilderness	Same as Alternative 3 plus enlarged visitor center Interpreted accessible trail and overlook at desert pupfish refugium Longer interpreted trail at visitor center site if 12 hectare (30 acre) adjacent site is acquired	Same as Alternative 4
Camping	Three designated campsites with tables and charcoal grilles Charcoal fires and fuel stoves only Maximum length of stay is 14 days	Same as No Action, plus 8 person party size and 7 day stay limitations	Same as Alternative 2	Same as No Action Plus 4 vehicle party size limit, 8 person party size limit Wood fires allowed with non-native wood at vehicle campsites and dead/downed wood in backcountry	Same as No Action, plus two additional campsites developed in non-wilderness Wood fires allowed with dead and down fuel

Table 2.9: Summary comparison of the management alternatives organized by planning issues identified in scoping (continued)					
Issue	**Alternative 1, No Action**	**Alternative 2**	**Alternative 3**	**Alternative 4 Preferred alternative**	**Alternative 5**
Cultural Resources Management	No on-site interpretation Site surveys prior to ground disturbance	Same as No Action	Same as No Action	Same as No Action, plus periodic cultural site inspections and stabilization if necessary	Same as Alternative 4
Border Law Enforcement/Illegal Entry	Beyond control of refuge Desert & wilderness training offered to border law enforcement staff	Same as No Action	Same as No Action	Same as No Action	Same as No Action
Military Use	Limited to provisions stipulated by PL106-65, Title XXX, including maintenance of communications infrastructure, over flight, and occasional area access restrictions in the interest of public safety.	Same as No Action	Same as No Action	Same as No Action	Same as No Action

3.0 THE AFFECTED ENVIRONMENT

3.1 GEOGRAPHIC/ECOSYSTEM SETTING

Cabeza Prieta is located along and north of the U.S./Mexico border between Yuma and Tucson, Arizona. Its 348,182 hectares (860,010) acres encompass Sonoran desert habitat and the largest wilderness managed by the U.S. Fish and Wildlife Service outside of Alaska. Together with adjacent OPCNM, the BMGR, lands held by the Tohono O'odham Nation and nearby Pinacate Biosphere Reserve in Mexico, a vast expanse of Sonoran desert is represented.

The refuge is located in the Sonoran region of the Basin and Range Province of North America. This is an extensive system of fault block mountains separated by wide alluvial valleys. The desert geologic processes produce topography characterized by stark mountains surrounded by large bajadas of alluvium (Simmons, 1965). Elevations on the refuge range from 183 meters (600 feet) MSL in the San Cristobal Valley to 1,186 meters (3,293 feet) MSL in the Growler Mountains, with the valley floors becoming progressively lower from east to west. The geology of the refuge is primarily basalts and granite, with some sedimentary material making up much of the alluvial structures and drainage corridors throughout the refuge.

The primary topographic features within the refuge include abrupt long, narrow, northwest-oriented mountain ranges (see figure 3.1 for a refuge map). Two types of mountains occur on the refuge: sierras and mesas. The sierra mountain ranges are characterized by jagged crests that vary little in height and rise steeply from valley floors. The mesas are gently inclined, or relatively flat, massive blocks cut by young canyons.

Separating the mountain ranges are broad, nearly level alluvial valleys and basins. Runoff from the mountains drains northward into the Gila River, westward to the Colorado River, and finally southward to the Gulf of California. Absence of an outlet for the draining water results in the formation of three desert playas or "dry lakes" on the refuge.

In the northeast corner of the refuge lies the Childs Mountain range. This range is approximately 14.5 kilometers (9 miles) long and is made up of volcanic layered plateaus and ridges. The Childs Mountains are approximately 460 meters (1,500 feet) above the valley floor at their highest point, and fall into the mesa-type category of mountains (Simmons 1965).

The little Ajo Mountains, which lie to the southeast of the Childs Mountain range, are composed of three groups of sierra-type hills. The longest of those groups is 8 kilometers (5 miles) long. These mountains are made up of mainly crystalline rocks and sediments. Rolling country with numerous canyons and arroyos separates the ranges. Broad pediments surround this mountain mass. The 43-kilometer (27-mile) Growler Mountain range runs through the northeast section of the refuge. The Growlers are primarily volcanic mesa-type formations. These mountains are composed of sandstone, tuft, conglomerate, and basalt. The east side gently inclines to a 460-meter (1,500-foot) western escarpment and then drops off abruptly.

The Agua Dulce Mountains, located in the lower southeast section of the refuge near the Mexican border, are approximately 19 kilometers (12 miles) long, and are northwest trending. The Agua Dulce Mountains are made up of three sierra-type masses surrounded by an extensive pediment. South of Papago Well and west of the Agua Dulce Mountains lie Davidson and O'Neill Hills. The hills are approximately 8 kilometers (5 miles) long and composed of coarse granite-gneiss or granite. These intricately faulted, miniature sierra-type mountains rise approximately 46 to 213 meters (150 to 700 feet) above the valley floor.

The Granite Mountains lie west of the Growler Mountains and Growler Valley. They are a sierra-type range extending approximately 24 kilometers (15 miles) across the BMGR and the refuge. These mountains have a jagged, sawtooth outline with the highest peak extending 305 meters (1,000 feet) above the adjacent valleys.

The basic composition of this range is granite with outcrops of grey schist. The Mohawk-Bryan Mountains are a 72-kilometer (45-mile) long, northwest trending range located west of the Granite Mountains. This sierra-type range rises steeply 457 meters (1,500 feet) above the desert floor and has a sharp jagged crest. The western slopes of the Mohawk-Bryan Mountains are generally steeper than the eastern slopes, with the composition of the range mainly granite and schist.

West of the Mohawk-Bryan Mountains lie the 40-kilometer (25-mile) long Sierra Pinta Mountains, another northwest trending, sierra-type range. The Sierra Pintas are narrow and steep with sharp peaks rising 610 meters (2,000 feet) above the valleys. These mountains are composed entirely of crystalline rock, divided by a distinct contrast between schist to the south and granite to the north.

The Cabeza Prieta Mountains lie west of the Sierra Pintas in the western part of the refuge. This sprawling, irregular mass, about 16 by 32 kilometers (10 by 20 miles), is composed of both crystalline complex rocks and overlying lavas and sediments. The varied composition of this range has produced tilted sierra-type ridges and dissected mesas and buttes with elevations of approximately 457 meters (1,500 feet). South of the Cabeza Prieta Mountains are the Tuseral Mountains, consisting of both the sierra and mesa-type topography. Although the largest part of this range is in Sonora, Mexico, approximately 6 kilometers (4 miles) extends into the refuge. The Arizona section of this mountain range rises 366 meters (1,200 feet) above the plains, with higher elevations in Mexico. These jagged and steep mountains exhibit signs of post-volcanic faulting.

Located outside the refuge's western border are the Tinajas Altas Mountains. This sierra-type, northwest trending mountain range is composed almost entirely of granite and related intrusive crystalline rocks.

The Pinacate Lava flow, which originated from the Pinacate Volcanic Field in northern Sonora, is located in the south-central part of the refuge. The northern tip of this flow extends 10 kilometers (6 miles) into the refuge and has an area of 78 square kilometers (30 square miles). The composition of the Pinacate Lava flow is olivine basalt combined with recent alluvial deposits. This is the most recent formation in the refuge other than the alluvial deposits in valleys.

Surrounding the northern, western, and eastern edges of the Pinacate Lava Flow is an area of wind blown sand deposits known as the Pinta Sands. These sands have blown eastward up against the Sierra Pintas from the Gulf of California, and are covered with vegetation making them fairly stable when undisturbed. This vegetation is thought critical in the diet of the Sonoran Pronghorn (Carr 1971).

Five major northwest trending valleys occur on the refuge. From east to west these are the Growler Valley, the San Cristobal Valley, the Mohawk Valley, the Tule Desert, and the Lechuguilla Desert. The southern Tule Desert drains into two large playas--Las Playas and Pinta Playa. A third playa -- Dos Playas -- is located in the Mohawk Valley. The playas occasionally hold water following rainstorms, but are very flat and composed of fine textured soils that are often high in salt content, thus resulting in limited plant growth.

Minerals containing thorium, uranium, copper, selenium, galena, gold, silver, rare earth, and tellurium are found on the refuge. The nonmetallic minerals of the refuge include beryl, barite, feldspar, mica, quartz, granite, limestone, marble, and strontium salts (USDI 1974).

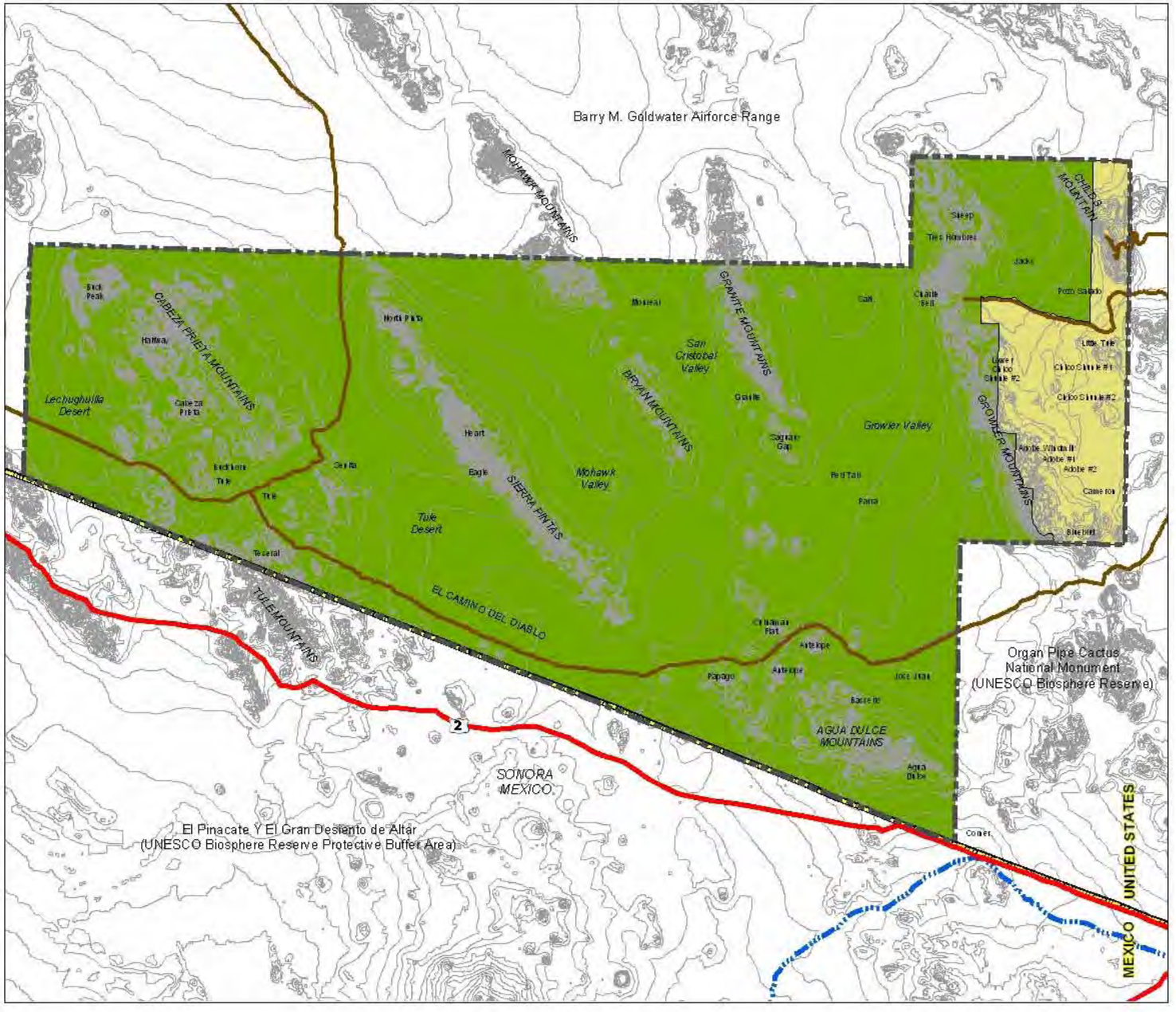


Figure 3.1 Refuge Map with Terrain Features and Jurisdictional Boundaries

Legend

- Cabeza Prieta N.W.R.
- Wilderness
- Non-Wilderness
- Public Roads
- US/Mexico Border
- Highway
- Rio Sonoyta

Sources: USFWS, 2006

0 1.5 3 6 9 12 Miles

CABEZA PRIETA
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE

3.2 LAND STATUS

The refuge is situated in the southwest corner of the State of Arizona and lies approximately 177 kilometers (110 miles) south of Phoenix, Arizona; 201 kilometers (125 miles) west of Tucson, Arizona; and more than 321 kilometers (200 miles) east of San Diego, California. The legal description of the refuge is as follows:

Gila and Salt River Meridian
Townships 11, 12,13S, R.7W
T. 14s, R. 7W, secs. 1 through 18
Tps. 11, 12, 13S, R. 8W
T. 14S, R. 8W, secs. 1 through 21, 28 through 33,
T. 15S, R.8W, secs. 4 through 9, 16 through 21, 28 through 33,
T. 16S, R. 8W, secs. 4 through 9, 16 through 21, 28 through 33,
T. 17S, R. 8W, secs. 4,5,6,8, and 9
Tps. 12 through 17S, R. 9W,
Tps. 12 through 16S, R. 10W,
Tps. 12 through 16S, R. 11W,
Tps. 12 through 15S, R. 12W,
Tps. 12 through 15S, R. 13W,
Tps. 12 through 15S, R. 14W,
Tps. 12, 13, 14S, R. 15W,
Tps. 12, 13, 14S, R. 16W.

In November of 1940, Executive Order 8598 set aside 16 hectares (40) acres in Ajo for an administrative site. Three residences have been built over the years. The remainder of the property was used as pasture for refuge horses. In 1969, Public Land Order 46171 revoked 12 hectares (30 acres) of that withdrawal and returned it to the state. A visitor center was built on the remaining 4 hectare (10 acre) site in 1980. Today the refuge is trying to lease or purchase the 12 hectares (30 acres) to add a nature trail to the visitor center. These are the only lands currently considered for acquisition.

In February 1974, FR Doc 74-5001, proposed the addition of 31,970 hectares (79,000 acres) on the west side of Cabeza Prieta NWR known as the Tinajas Altas and a change in name from Cabeza Prieta Game Range to Cabeza Prieta NWR. Public Land Order 5493 (1975) effected the name change and addition, but Tinajas Altas was withdrawn three months later. The area is currently managed by the BLM, but natural resource responsibilities were transferred to the BMGR by the Military Lands Withdrawal Act of 1999. An integrated natural resource management plan for BMGR was completed during 2006.

3.3 THE PHYSICAL ENVIRONMENT

3.3.1 Climate

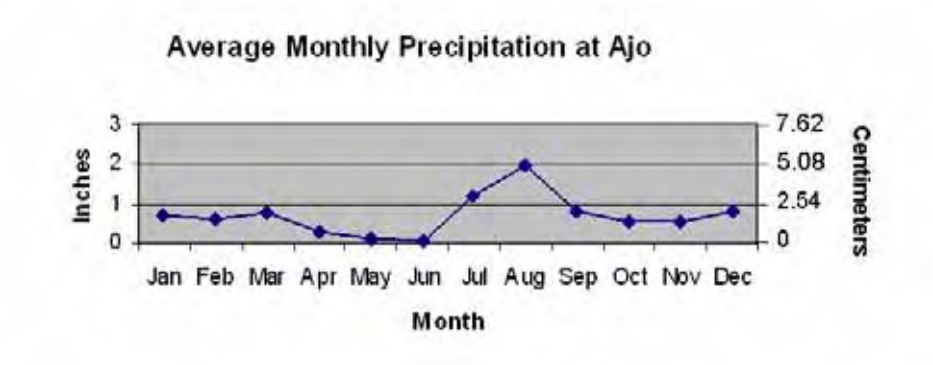
The climate of the Cabeza Prieta NWR is typical of the Sonoran Desert environment. Mean annual precipitation on the refuge is less than 26 centimeters (10 inches), varying from 23 centimeters (9 inches) on the east side of the refuge to 8 centimeters (3 inches) on the west side. Valleys within the refuge receive approximately 10 centimeters (4 inches) less precipitation than the mountain ranges (Simmons 1969). Studies conducted by the Desert Laboratory in the 1920s and 1930s provide the earliest information on refuge specific rainfall patterns. As a general rule for the study region, which extended into Mexico, they determined that given localized variations, rainfall increased with elevation. Below 305 meters (1,000 feet) above mean sea level (MSL) rainfall averaged 10.74 centimeters (4.19 inches) per year; 305-610 meters (1,000-2,000 feet) MSL averaged 20.77 centimeters (8.10 inches) per year; 610-914 meters (2,000-3,000 feet) MSL averaged 28.28 centimeters (11.03) inches per year; and above 924 meters (3,000 feet) MSL averaged

64.1 centimeters (25 inches) per year. The study did include an exception for the lowest mountain ranges which may be dryer at the top (USFWS 1952). The refuge is located between 209 meters (685 feet) MSL (along Mexican border in the Pinta Sands area) and 974 meters (3,196 feet) MSL elevation (highest point in Growler Mountains). Rainfall studies conducted on the refuge 1991 through 1994 indicated variability in excess of 26 centimeters (10 inches) from location to location in one year, and as much from year to year at a given location (Comrie and Broyles 1997).

Most of the precipitation occurs from July to September in the form of intense thundershowers. Moisture responsible for these storms (monsoons) originates almost entirely from the Gulf of California, and can drop large amounts of precipitation in short periods of time. Usually storms are localized in nature. The intensity of the storms results in rapid runoff, making most of the moisture unavailable to plants. Another wet period occurs from December to February, generally as widespread gentle rains. These rains originate off the Pacific Coast as frontal systems and because of the moderate nature of this precipitation; the water is able to soak into the soil providing moisture for vegetation.

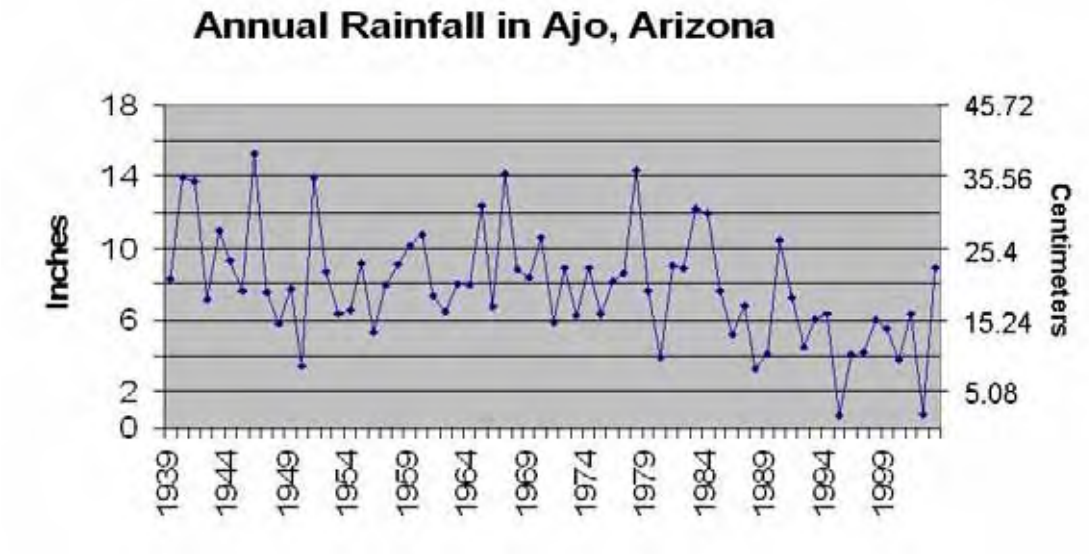
The driest months on the refuge are May and June, when the relative humidity commonly drops to 10 percent or lower. A second, less extreme dry period occurs between September and December (Smith 1974). The highest relative humidity is recorded during the late summer rainy seasons. Heavy thunder showers nearly saturate the air resulting in relative humidity of 80 to 90 percent. Figure 3.2 shows average monthly precipitation in Ajo.

Figure 3.2



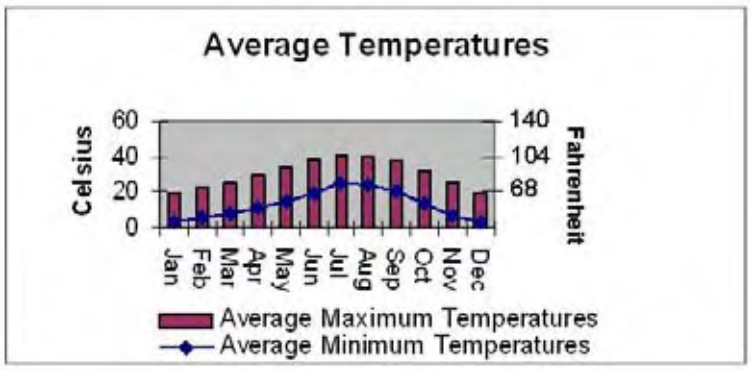
Seasonal rainfall averages for the Ajo weather station are as follows: Winter (January-April) 5.46 centimeters (2.15 inches), Summer (May-August) 7.86 centimeters (3.10 inches), and Fall/Winter (September-December) 6.70 centimeters (2.64 inches) for a total rainfall average of 20.02 centimeters (7.88 inches) (Western Regional Climate Center 2004) In 65 years of records at the Ajo Station, there are very few “average” years (figure 3.3 presents annual rainfall totals for the Ajo Station). Rainfall totaled within 1.28 centimeters (0.5 inch) of that amount only 12 years, with 31 years measuring above average and 34 measuring below average rainfall. Annual totals for the years between 1943 and 2003 varied from 1.7 centimeters (0.67 inches) in1995 to 38.79 centimeters (15.27 inches) in 1946, more than a 37-centimeter (14-inch) difference. The decade of the 1960s totaled 230.58 centimeters (90.78 inches) whereas the 1990s produced only 123.16 centimeters (48.49 inches) of rainfall. The usual pattern is a year or two above average rainfall followed by a year or two below average, but occasionally wet or dry spells last several years. The longest “wet” spell lasted from 1981-1986 with six years of above average rainfall. The longest “dry” spell lasted from 1991 to 2002 with 12 years of below average rainfall, including the two driest years recorded at Ajo (1995 and 2002). These variations must be considered when evaluating other changes over time such as vegetation or wildlife populations.

Figure 3.3



The refuge experiences some of the highest temperatures in North America (figure 3.4 provides monthly average high and low temperatures averaged from the Ajo, Welton and Tacna weather stations). The daily highs from mid-May to mid-September generally exceed 38 degrees Celsius (100 degrees Fahrenheit). Ninety consecutive days of 38 degrees Celsius (100 degrees Fahrenheit) or higher are common, with temperatures at times reaching 54 degrees Celsius (130 degrees Fahrenheit) in the canyon areas (USFWS 1971). Summer nighttime temperatures generally average between 23 and 27 degrees Celsius (73 to 81 degrees Fahrenheit), and rarely drop below the 18 degrees Celsius (65 degrees Fahrenheit). Winter months on the refuge are characterized by more moderate temperatures. Daytime temperatures average between 19 and 25 degrees Celsius (66 and 77 degrees Fahrenheit) with nighttime temperatures between 4 and 10 degrees Celsius (40 and 50 degrees Fahrenheit). There are approximately 320 frost-free days per year on the refuge.

Figure 3.4



High temperature and low humidity result in high evaporation rates for the area, ranging from 1.9 meters (74 inches) per year on the eastern edge of the refuge to 2.0 meters (78 inches) per year on the western edge. A large part of the precipitation in this area evaporates and a limited amount is used by the existing

plant life (Simmons 1969).

In the eastern portion of the refuge, westerly winds prevail during the summer and easterly winds prevail during the rest of the year with wind speeds averaging 5 to 8 kilometers per hour (3 to 5 miles per hour). In the western portion, southerly winds predominate during the summer and northerly winds prevail during the rest of the year with winds averaging 8 to 10 kilometers per hour (5 to 6 miles per hour). Strong winds of 81 to 97 kilometers per hour (50 to 60 miles per hour) may accompany storm fronts and pick up dust and sand, creating local dust storms.

3.3.2 Air Quality

Three air quality monitoring sites are located near the refuge in Ajo, Yuma and at OPCNM. The Ajo monitor had provided data on particulates and sulfur dioxides while the Phelps Dodge copper smelter was operational; it currently only provides data on particulates as the smelter is now closed. The site at Yuma monitors carbon monoxide, ozone, and particulates. The site at OPCNM measures background particulate concentrations. The Yuma site is influenced by industry and urbanization and does not accurately reflect pollution levels on the refuge itself. Extrapolating data from OPCNM site is also inaccurate due to differing micro- and meso-scale climatic conditions and terrain of the two areas (USAF 1980).

The wilderness preservation area within the refuge is a Class II prevention of significant deterioration air quality area under the Clean Air Act Amendments of 1977. This status has specific ramifications on the permitting and review of potential new sources of air pollution in the region. Currently the air quality over the refuge appears to meet federal and state standards, with the exception of the 24-hour suspended particulate standard, which could be exceeded during days with high winds.

3.3.3 Soils

Five soil types occur on the refuge. All of these soils are hyper thermic (very hot), arid in nature, and are typical of desert areas having a discontinuous pattern. The steeper mountain areas are without soil, while the more gradual mountain slopes have shallow coarse soil. Coarse grained deposits form 98 percent of the alluvial fans, bajadas, and stream channels. The average composition is 30 percent gravel, cobbles, and boulders; 40 percent sand; 25 percent silt; and 5 percent clay. Fine grain deposits of clay and silts occur in playas with dunes consisting of wind-blown sand. Most of the soil is high in salts. The coarser soils found on up-slope areas usually hold more available water than the fine textured basin soils and are able to support more diverse vegetation (USAF 1980).

Cryptogamic soil crusts, also known as cryptogam, occur widely on valley floors in the refuge. These tiny, black, irregularly raised pedestals in the sand are self-sustaining biological communities essential to the ecology of arid lands. They reduce erosion, fix nutrients, and increase water absorption, creating a more hospitable environment for other plants. Cryptogamic soils are fragile and very susceptible to damage from trampling and compaction (National Outdoor Leadership School 1994).

Desert pavement, a layer of coarse gravel and cobble-size material, occurs in the surface of the older alluvial fans. When the pavement layer is disturbed, the surface soils become more susceptible to erosion. Desert varnish, a mineralized coating, may also occur on the desert pavement.

3.4 WATER RESOURCES

3.4.1 Natural Surface Waters

The refuge lies within the Colorado River Basin where ground and runoff water in the northwest trending valleys flow toward the Gila River. No perennial water bodies exist on the refuge and supply of surface water is scarce, varying with the seasons. At times there is great surface runoff from summer rains, but most of this is rapidly consumed by evaporation and infiltration in the alluvial valleys. All streams within the refuge are ephemeral, flowing only during or after rains. Usually only a section of any one stream flows at one time. The largest surface water area is the ephemeral Las Playas. Smaller surface water areas include Dos Playas and Pinta Playa. These playas occasionally hold water for a few days after a very heavy rain.

Ephemeral water in natural tinajas

USFWS Photo

Natural tinajas occur in the mountain ranges throughout the refuge. A tinaja is a hole or depression in the rock formed by scouring water that holds water for a varying length of time after rains. Virtually all the natural water sources on the refuge have been developed to increase the volume of water stored after storm events. Waters such as Heart Tank, Buckhorn Tank, Cabeza Prieta Tanks and Agua Dolce Springs are examples of natural waters that have been developed by the refuge. Refuge staff was able to identify 10 natural sites, but refuge reports from the early years mention others that have not been located (Van Riper *et al.* 1987). In an article examining water resources available to prehistoric peoples, Broyles (1996) identified and estimated quantities for 15 sources located on the refuge. Most of theses natural tinajas were later developed to increase water-holding capacity.

In a study on waterholes in the Cabeza Prieta Mountains, Childs (1998) measured 53 individual holes with a total volume of 20,982 liters (5,543 gallons) and measuring from 7 centimeters (2.7 inches) to 120 centimeters (46.8 inches) in depth. The author cautioned that this estimate represents maximum capacity for the pools during high levels of precipitation. Childs states “most of the pools will dry within several weeks if there is no precipitation.” Childs identifies the sequence of tinajas known as Cabeza Prieta Tanks as the largest in the area, holding 16,830 liters (4,446 gallons) and found two other unnamed pool sequences, which held 1,885 liters (498 gallons) and 1,522 liters (400 gallons) respectively. The three pool sequences together comprise 96 percent of the range’s water with the developed tank holding 80 percent of the range’s water. These three pool sequences hold water the longest, with Cabeza Prieta Tanks being the last to dry up. A 2.8 by 9.8 meter (9 by 32 foot) dam was built across the drainage at Cabeza Prieta Tanks in 1938. It has since filled with sediment and no longer holds surface water, but does hold water in the sediment, releasing it slowly through cracks in the dam. Two other developed tanks in the range were not included in the study because of the intensive human alterations at Halfway and a dynamited tinaja at Cabeza Prieta Tanks.

Agua Dulce, the other well-known natural water source, is a natural seep in the southeast corner of the refuge. It is thought to be generated from an artesian system, but further study is warranted regarding the geohydrology that is active at the spring.[7] Agua Dulce was formerly thought to be perennial, but has been

[7] A draft report entitled “An Investigation into the Hydrology and Ecology of Agua Dulce, Cabeza Prieta NWR” was issued in September 1996. The report presents a summary of past research and observations in the area of the Agua Dulce seep and tank and the results of a filed investigation and water quality monitoring of the seep undertaken by the Branch of Water Resources in May 1996.

dry for several years in the 1990s, likely due to water table depression caused by well pumping in Ajo.

3.4.2 Developed Waters

There are 34 operational developed waters on the refuge (see table 3.1 and figure 3.5). Twenty-seven are located within the wilderness area. Several additional wells and livestock waters[8] were developed by early ranchers but are now inoperable either due to sand/salt intrusion or damage to the wells.

Dam at Heart Tank- this developed structure increases the capacity of Heart Tank, a natural tinaja

USFWS Photo

Although livestock wells and waters existed prior to establishment of the refuge, the first water developments for wildlife were constructed in the 1950s. The early developments were located in the mountains and constructed primarily for desert bighorn sheep. Later developments were created for pronghorn and drinkers were added to benefit quail, deer, javelina and other wildlife. Early refuge annual narratives indicate that locals believed both the bighorn and pronghorn left the refuge in the summer, traveling to Mexico for food and water. In part, water was developed to keep sheep and pronghorn from leaving the refuge. Wildlife managers then believed water to be the most important factor limiting populations of desert animals, especially bighorn sheep. Water was believed to increase range carrying capacity, redistribute populations into unused areas, hold populations to prevent migration, and prevent population crashes during droughts. While recent inquiries and studies, including a 1995 study by Broyles have questioned this reasoning, developed water is an established wildlife management tool.

Five types of water developments are found on the refuge (see table 3.1): buried reservoirs with collection points and drinking troughs ("improved waters"), runoff tanks (modified tinajas), charcos, wells, and tanks with drinkers. Improved waters are typically constructed of one or more 1780-liter (470-gallon) pipes connected to water collection points in natural drainage courses and wildlife drinking troughs. The tanks are covered with native soil, in Sonoran pronghorn habitat, or cement shaped and tinted to resemble native rock, in desert bighorn sheep habitat, and have very little visual impact on the surroundings. Runoff tanks mimic natural tinajas and are the next most natural looking structures. They are created by either blasting holes in rock or building small dams in mountain washes. A few hold water throughout the season. Charcos are dugout ponds also locally called repressos. An area is bulldozed and lined to hold water. The charcos dry up during the driest time of year. Tanks and drinkers were added to charcos and other sites to augment water in dry months. These structures require hauling water once or twice each year. Most of the wells are located outside of wilderness. They were developed for livestock when grazing was permitted and now feed drinkers for wildlife. Most are located in pronghorn habitat, but levels of use by pronghorn are poorly understood.

Also included are discussions of the hydrologic and ecologic characteristics of the seep and interpretations of the hydrologic interrelationships of the seep, spring, and tank. A final version is pending receipt of water sample analysis from American Environmental Network, Inc, (contract laboratory). Additional sampling may be necessary to draw final conclusions.

[8] Van Riper, 1987, listed these 16 wells as no longer in operation: Bluebird Mine Well, Corner Well, Monreal Well, New Well, Sahuaro Gap Well, Salt Well, Lower Well, Sam Clark Tank, Seven Wells, Suni Well (2), West Well, Pozo Salado, Dan Drift Well, McMillan Well, Point of Pintas Ranch, Steel Tanks.

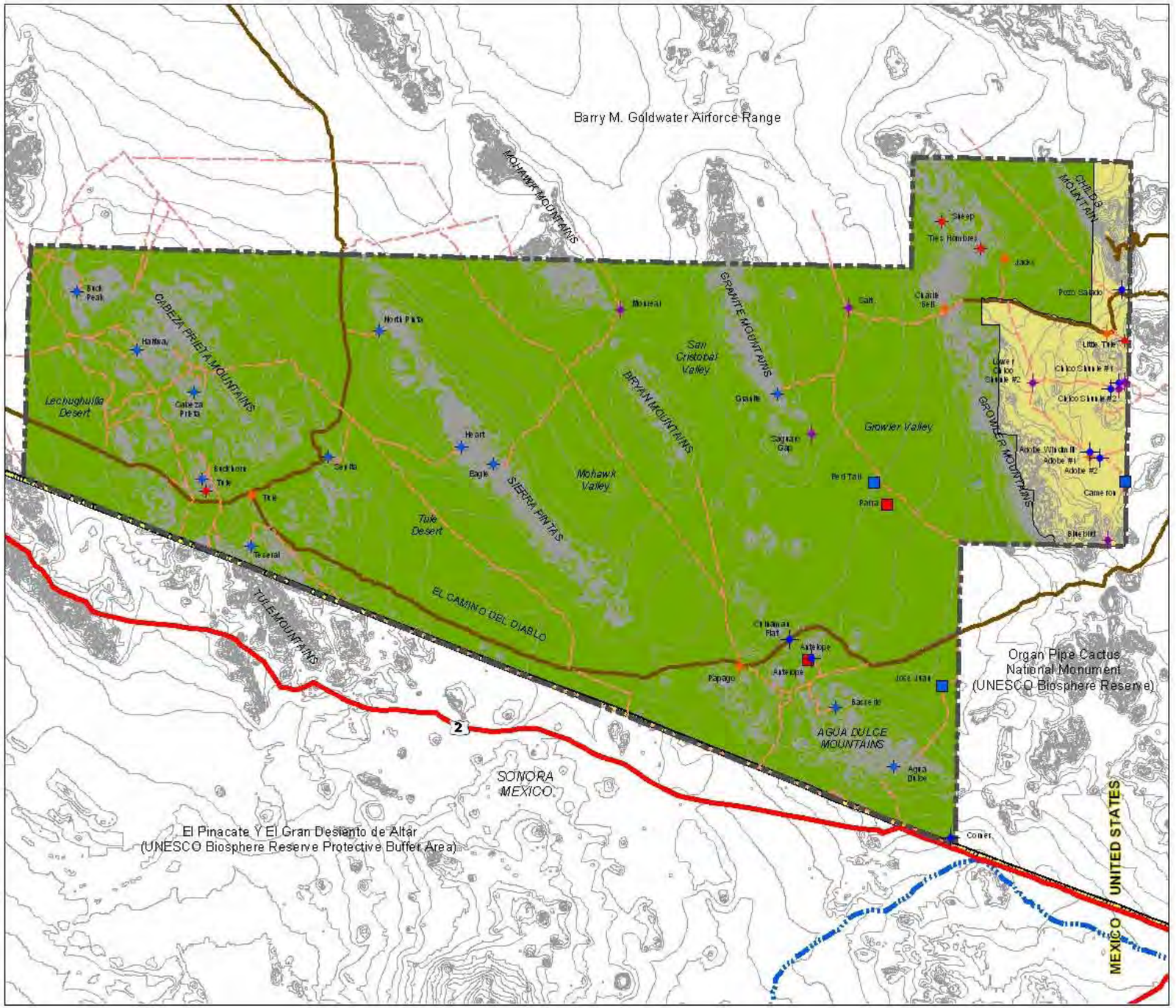


Figure 3.5 Developed Waters

Legend

- Cabeza Prieta N.W.R.
- Wilderness
- Non-Wilderness
- Public Roads
- Administrative Trails
- US/Mexico Border
- Highway
- Rio Sonoyta
- Active Well
- Active Tinaja / Tank
- Inactive Tinaja / Tank
- Inactive Well
- Capped Well
- Active Charco
- Inactive Charco

Sources: USFWS, 2006

0 1.5 3 6 9 12 Miles

CABEZA PRIETA
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE

Table 3.1 Developed Waters of Cabeza Prieta National Wildlife Refuge			
Name/Habitat	Type of water	Wilderness	Current Activity
Adobe/ pronghorn	Well, tank & drinker	No	Monitoring and maintenance, some water hauling
Adobe House/ pronghorn	Well, tank and drinker	No	Recently redeveloped, monitoring and maintenance
Agua Dulce/ bighorn	Runoff tank with dam	Yes	Monitoring; proposed for redevelopment
Antelope/pronghorn	Improved water	Yes	Monitoring, maintenance, emergency hauling only
Bassarisc/ pronghorn and bighorn	Improved water	Yes	Monitoring, maintenance, emergency hauling only
Buckhorn/ bighorn	Runoff tank	Yes	Monitoring, maintenance, hauling, redevelopment proposed
Buck Peak/ bighorn	Runoff tank	Yes	Recently redeveloped, monitoring and maintenance, some water hauling
Cabeza Prieta/bighorn	Runoff tank	Yes	Monitoring & maintenance
Charlie Bell/ bighorn & pronghorn	Well, tank and drinker	Yes	Monitoring and maintenance
Chico Shunie/ pronghorn	Well, tank and drinker	No	Nonfunctional
Childs Mountain/ bighorn	Parabolic collector	No	Monitoring, maintenance, and hauling
Eagle/bighorn	Runoff tank	Yes	Monitoring, maintenance, hauling, redevelopment proposed
Granite/bighorn	Runoff tank	Yes	Monitoring, maintenance, hauling, redevelopment proposed
Halfway/bighorn	Runoff tank	Yes	Recently redeveloped, monitoring and maintenance, some water hauling
Heart/bighorn	Runoff tank	Yes	Recently redeveloped, monitoring and maintenance, some water hauling
Jacks/pronghorn	Well, tank & drinker	Yes	Monitoring, maintenance, hauling, redevelopment proposed
Jose Juan/pronghorn	Charco, tank & drinker	Yes	Monitoring, maintenance & hauling
Little Tule/pronghorn	Well, tank & drinker	No	Monitoring, maintenance, hauling, redevelopment proposed
Lower Well/pronghorn	Well	No	Recently redeveloped, monitoring and maintenance
North Pinta/ bighorn	Runoff tank	Yes	Recently redeveloped, monitoring and maintenance, some water hauling
Papago/pronghorn	Well, tank & drinker	No	Monitoring, maintenance & hauling
Redtail/pronghorn	Charco, tank & drinker	Yes	Monitoring, maintenance, & hauling
Senita/bighorn	Runoff tank	Yes	Monitoring, maintenance, hauling, redevelopment proposed
Tiller/pronghorn	Well, tank & drinker	No	Monitoring & maintenance

Table 3.1: Developed Waters of Cabeza Prieta National Wildlife Refuge (continued)			
Name/Habitat	Type of water	Wilderness	Current Activity
Tule/bighorn	Runoff tank	Yes	Monitoring, maintenance & hauling
Tuseral/bighorn	Runoff tank	Yes	Monitoring, maintenance, hauling, redevelopment proposed
9 emergency waters/ pronghorn	New and improved waters of limited storage	Yes	Monitoring, maintenance & hauling; enlargement and improvements proposed

3.4.3 Ground Water

Deep alluvial sediments in the valley floors provide large reservoirs for groundwater. The water has accumulated over thousands of years with very small annual increments added. The valley east of the Growler Mountains is known to have shallow groundwater, as does Copper Canyon in the northeastern portion of the refuge. A few wells ranging in depth from 9.1 meters to 122 meters (30 to 400 feet) have been developed that use these two groundwater resources. The wells are operated by windmill.

The extent and nature of dependable groundwater is not yet fully known, but there is a possibility that agricultural uses in Mexico are diminishing supplies. According to the Arizona Water Commission there is no potential in the area for groundwater development for irrigation supplies, and only limited potential for development of groundwater for municipal and industrial supplies (Arizona Water Commission 1975).

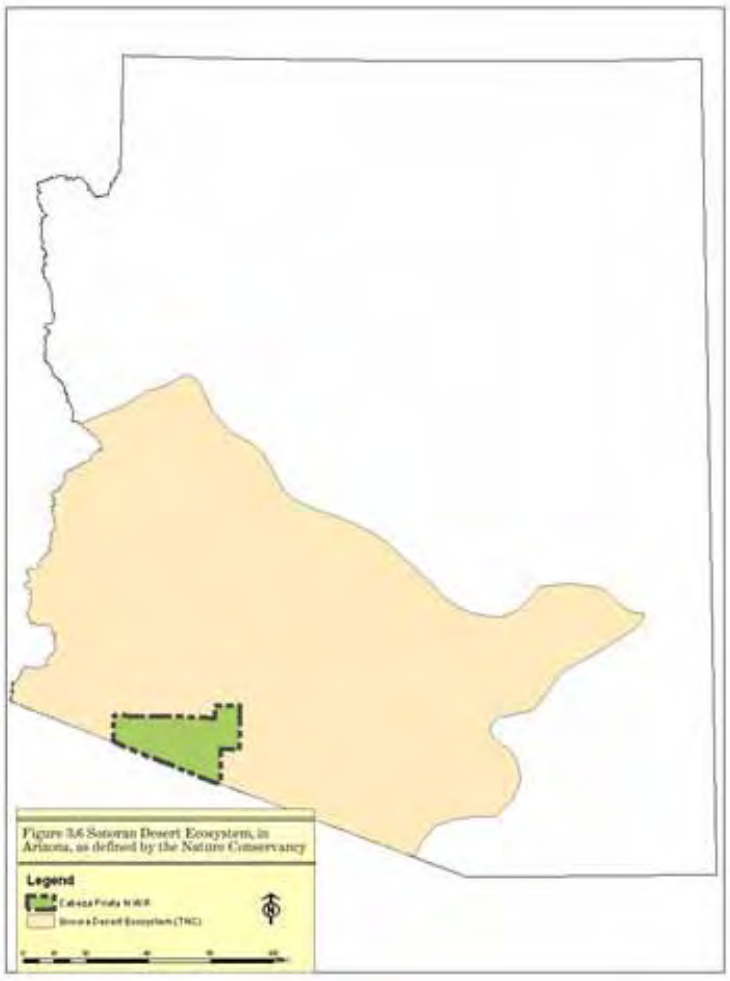
Little information is available on the quality of groundwater on the refuge. Many areas of the refuge have groundwater that is unsuitable for domestic, municipal, and industrial water supplies. All of the refuge's groundwater supplies are unsuited for irrigation water because of high salt content, extreme depth making it too costly to reach, or insufficient yield (Arizona Water Commission 1975).

3.5 REFUGE HABITAT AND WILDLIFE RESOURCES

3.5.1 Biotic Community and Biodiversity

Cabeza Prieta NWR is located within the Tropical-Subtropical Desertland climatic zone (Brown 1994). This climatic zone includes many of the world's deserts such as the Kalahari and Namib which are located on or near the Tropic of Cancer or Tropic of Capricorn and have developed because prevailing winds have lost their moisture by the time they reach these areas. Within that zone, the refuge is part of the Sonoran Desert scrub biome or habitat type as described by Brown (1994). Arizona contains approximately 34 percent of the total range of this habitat type.

The Sonoran Desert (figure 3.6) is unique because its biseasonal rainfall makes it lush by desert standards. The desert is fairly young, having developed only 8,000 to 9,000 years ago. As a young desert, the Sonoran Desert lacks a distinctive fauna of species evolved to its conditions, rather the common animals of the desert are found throughout the drier regions of the Southwest. The Sonoran Desert differs from other American deserts in that it is dominated by trees and large cacti rather than low shrubs and is sometimes referred to as an arboreal desert. The flora is derived from subtropical elements to the south. The refuge is located towards the center of the Sonoran Desert region, on the edge of two subdivisions and contains 400 plant species from 68 families (see plant list, Appendix E).



The refuge's sporadic rainfall, varied geographically and temporally (see discussion above under Physical Environment), is the principal factor affecting plant growth. The amount and seasonal distribution of precipitation has the greatest influence on distribution of plant species.

Two of the six subdivisions of the Sonoran Desert (Brown 1994) are represented on the refuge. The Lower Colorado Valley subdivision is the largest and most arid subdivision of the Sonoran Desert, extending from Palm Springs, California to the west, to Phoenix, Arizona on the north, and from midway on Baja to Caborca in Mexico where it is bisected by the Gulf of California. Most of the refuge is located in this subdivision as it contacts the Arizona Upland on its eastern boundary. It is differentiated from the Arizona Upland by lower rainfall and higher winter minimum temperatures. The Lower Colorado Valley subdivision generally occurs on lower bajadas and the inner mountain alluvial plains. In the Creosotebush-White Bursage Series, vegetation is simple and open, consisting predominately of low open stands of widely spaced creosotebush

and white bursage. Diversity increases in washes where a Mixed Scrub Series includes: honey mesquite, ironwood, blue paloverde, smoketree and jojoba. The Saltbush Series is represented in only a tiny area on the extreme southeast corner of the refuge. Here the soil is finer, holds water longer and supports saltbush. In other regions of the Sonoran Desert, most of this Saltbush Series is now under cultivation. More arid areas may be devoid of perennials, covered instead with varnished pebbles called "desert pavement". In wet years, playas (broad basins that hold water temporarily) can be covered with dense annuals.

Harris' hawk on saguaro cactus skeleton

drawing by Bonnie Swarbrick

Only a few large mammals are represented here including desert bighorn sheep, Sonoran pronghorn, bobcat, mountain lion, and coyote. Other mammals include rabbits, burrowing rodents, and bats. Bird diversity and abundance is low, consisting of arid adapted resident species and Neotropical migrants moving through the refuge in the spring and fall. Reptiles, on the other hand, are well represented by unique species. The banded sand snake and flat-tailed horned lizard are sand adapted reptiles found only in the Lower Colorado Subdivision and Mohave Desert. Rocky outcrops, bajadas, washes, and plains all support varied reptiles, including six species of rattlesnakes, desert tortoise, and numerous lizards including Gila monster A few species of amphibians also occur the throughout the refuge inhabiting water catchments and natural ephemeral water sources following the summer rains and inhabiting borrows during non-breeding periods.

The Arizona Upland subdivision is found on the upper bajadas and lower altitudes of the refuge's mountains. This division is the Sonoran Desert of postcards and is the best-watered desert in North America. A number of other species found mostly in washes in the previous division occur commonly here, but foothill paloverde and saguaro dominate. Ironwood is excluded from cold valley floors because of its frost intolerance. Creosote remains as a low, shrubby layer. Cacti form an important element with many largely confined to this subdivision. Cane cholla, chain fruit cholla, and barrel cactus are only a few of the species found here. Other species include whitethorn acacia, limber bush, ocotillo, jojoba, fairy feather duster and cacti such as Engelmann prickly pear.

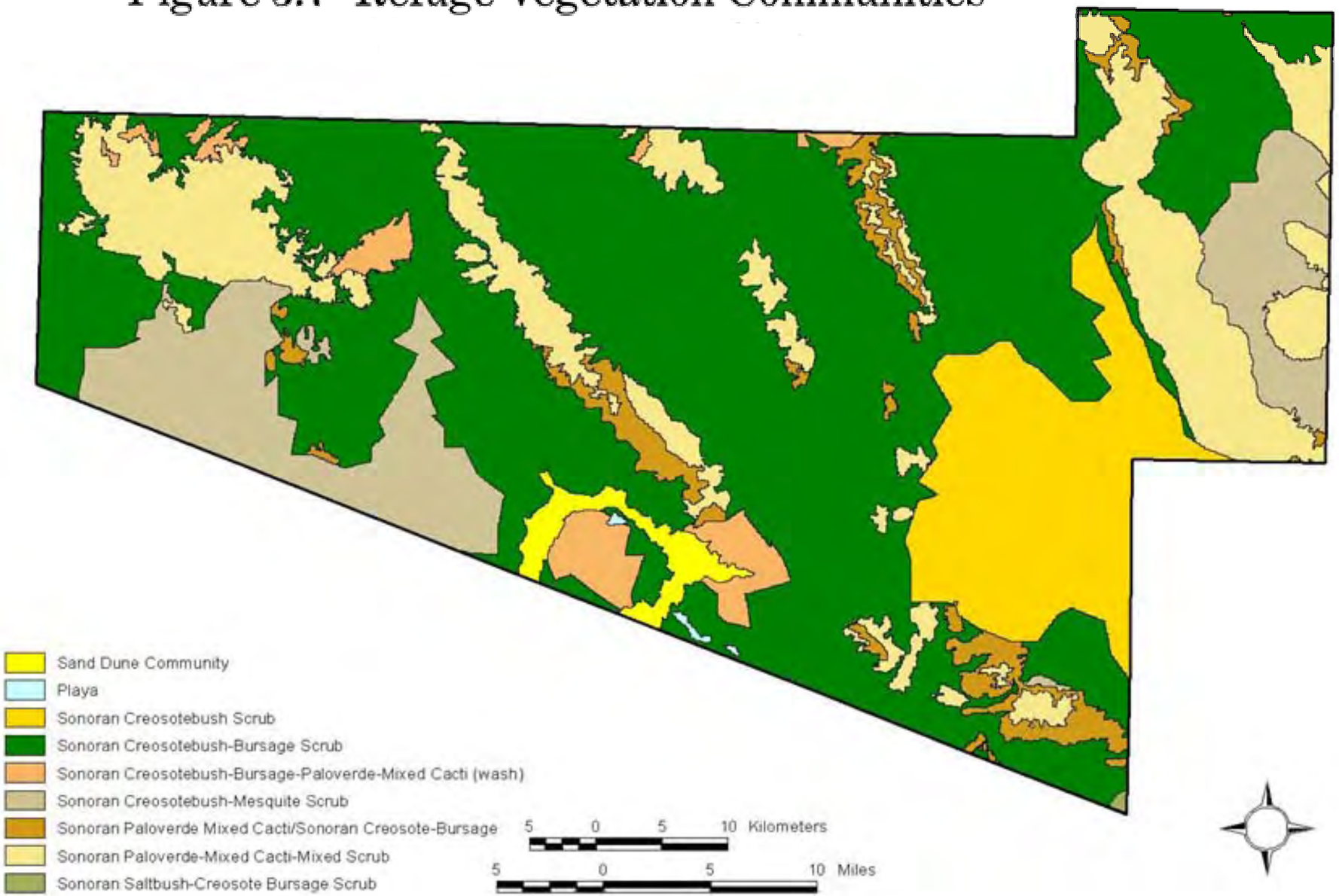
This division may support mule deer, javelina and bobcat, as well as other small mammals, including California leaf-nosed bat, California myotis, black-tailed jackrabbit, and numerous rodents. Its bird life is more diverse than that of the Lower Colorado Valley subdivision, with many species common to Mexico's thornscrub to the south. Harris' hawk, Inca dove, and elf owl, represent this group, whereas cactus wren, curve-billed thrasher, and greater roadrunner are more widespread. Several lizard species are limited to this region including regal horned lizard and Gila monster.

The contact between these subdivisions is characterized by a broad area where floristic complexity increases from the simple Lower Colorado to more diverse associations of the Arizona Upland.

3.5.2 Plant Resources

The refuge supports 400 documented plant species (species list Appendix E). Figure 3.7 is a map of plant communities on the refuge. No endangered plant species has been identified on the refuge, although the threatened Pierson's milkvetch has been documented on BMGR and may occur on the refuge. The once endangered Kearney desert sumac is found on the refuge in the Cabeza Prieta Mountains and immediately

Figure 3.7 Refuge Vegetation Communities



outside the refuge's western boundary in the Tinajas Altas Mountains. Although the Kearney sumac is rare in the United States, it is common in some areas of Mexico. Other species of interest specific to this region of the southwest and Mexico include: Ajo lily, chain-fruit cholla, saguaro, desert spurge, dune sunflower, silver cholla, Spanish needles, blue sand lily, desert rock daisy, elephant tree, ironwood, and senita cactus.

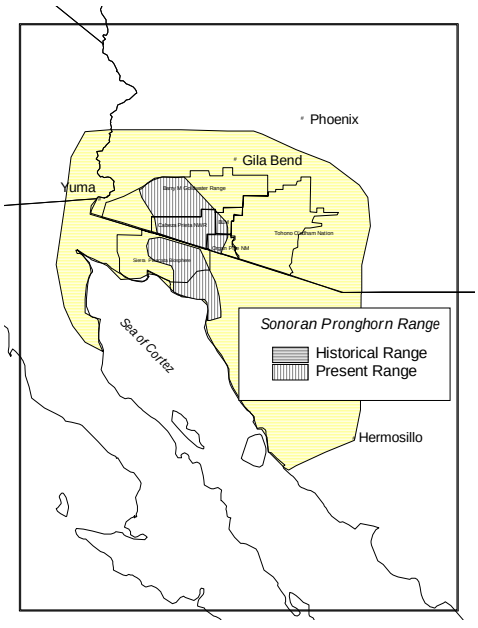
Overgrazing by domestic stock has affected the soils and vegetation. Overgrazing occurred over much of the refuge from the late nineteenth century until the Cameron grazing lease was discontinued in 1981. Overgrazing in the Sonoran Desert tends to increase soil erosion, decrease overall plant species diversity and favor increases in creosotebush density in valleys (Hall *et al.* 2001). Desert ecosystems recover slowly from overgrazing, and the effects of overgrazing are still apparent on some areas of the refuge. The Arizona Upland subdivision, where plant diversity is higher than in the Lower Colorado subdivision and soil types are more susceptible to erosion, is more prone to adverse effects from overgrazing. In the early years after refuge establishment, burros were common on the refuge and congregated in washes. Mortality to mesquite and paloverde from girdling by burros in washes impacted bird species dependent on this habitat. Burros were largely removed when aerial bombing began in 1942, and wash vegetation has been recovering.

Invasive species such as red brome, fountain grass, Sahara mustard and bufflegrass threaten to change the structure and species composition of the Sonoran Desert. These exotics allow fire to invade a plant community that has evolved without fire. Cactus in particular and some perennial trees and shrubs are killed. This disruption is predicted to impact bird and other wildlife species.

Plant resources in this region also have cultural significance. Traditional and present day Native Americans utilize plant resources for food, medicine, tools, building materials, baskets and other containers, clothing, and ceremonial purposes. Some of the more important cultural plants found on the refuge include: creosote bush, agave, beargrass devil's claw, mesquite, organ pipe cactus, saguaro, desert bean, ocotillo, coyote gourd, and amaranth.

3.5.3 Mammals

Forty-two species of mammal are known to inhabit Cabeza Prieta. Mammals can cope with high daytime temperatures and arid conditions in a variety of ways. Many are nocturnal, live below ground, and possess various physiological, morphological, or behavioral adaptations. The majority of mammals found on the refuge are small nocturnal animals that inhabit burrows. This includes numerous species of pocket mice, kangaroo rats, wood rats, and foxes. In addition, bats represent the most diverse group of mammals, with eleven species observed on the refuge. Typical mammal species found in the Lower Colorado River Valley subdivision include: desert kangaroo rat, round-tailed ground squirrel, kit fox, and badger. Typical species for the Arizona Upland division include the majority of bat species including California leaf-nosed bat, lesser long-nosed bat, and pocketed free-tailed bat. Other species include Arizona pocket mouse cactus mouse, southern grasshopper mouse, and desert bighorn sheep. Other species are found to inhabit both subdivisions including desert cottontail, pocket gopher, and coyote.



3.5.3.1 Federal Endangered Species

3.5.3.1.1 Sonoran Pronghorn (*Antilocapra americana sonoriensis*)

The Sonoran pronghorn, one of five recognized subspecies of pronghorn, was classified as an endangered species on March 11, 1967 (32 FR 4001). The Sonoran pronghorn is distinguished from other races of pronghorn by its smaller size, paler color, and certain cranial features. The relationships and taxonomic validity of the five subspecies are currently

under review, and the genetic makeup of Sonoran pronghorn relative to the other four subspecies is being investigated by scientists in the U. S. and Mexico. Although genetic markers evaluated to date show some similarity, the genetic "relatedness" between Sonoran pronghorn and one or more of the other races of pronghorn needs additional work. Regardless of the outcomes of this work, the subspecies *sonoriensis* was properly described and named by a knowledgeable authority who determined that it differed substantially from other subspecies. The subspecies designation will continue to be valid until a thorough reassessment, using an appropriate series of specimens, comes to a different conclusion that is generally accepted by the mammalogical community. In the event Sonoran pronghorn are eventually found to be genetically or otherwise "indistinct" from one or more of the other subspecies, it would likely continue to be managed under the "distinct population segment" provision of the Endangered Species Act.

Pronghorn in general are long-legged, small-bodied ungulates that are endemic to North America and are distinguished from all other ungulates in the world by their horns. While both sexes have horns, the males' are much larger. The unbranched, boney horn core is part of the skull and is covered with a black sheath. Only the sheath is shed annually in the fall. This feature, more than any other, is responsible for the pronghorn's classification as the sole surviving species in the family Antilocapridae. Pronghorn are probably best known for their amazing running ability and endurance, and uncanny eyesight. Easily the fastest land mammal in the New World, the pronghorn is capable of sustained speeds of 64-72 km/hr (40-45 mph), with short bursts approaching 100 km/hr (62 mph). The pronghorn's large, forward set eyes are an adaptation for spotting potential threats at distances as great as 6.4 km (4 miles) in the open habitats they prefer.

Pronghorn have a harem or polygynous mating system (i.e., one male breeds with more than one female). Female pronghorn become sexually mature in their second year and males at about one year of age (O'Gara 1978). Pronghorn bucks rarely breed at this early of an age, however, due to competition with older, more dominant bucks. The rut in Sonoran pronghorn generally occurs July to September. Pregnancy lasts an average of 252 days (O'Gara 1978), an extended period relative to other ungulate species of comparable size. Pronghorn invariably produce twins. Sonoran pronghorn fawns are dropped in February through May, a period that coincides with spring forage abundance. Total fawn biomass (twins) is high relative to body mass of does, and is partly a consequence of the length of gestation. The high maternal investment in reproduction (i.e., lengthy gestation, obligate twinning, high fetus biomass to doe ratio, rapid fawn growth, early weaning) has been speculated to be an evolutionary adaptation to predation (Byers 1997). Pronghorn fawns suckle almost exclusively the first month of life. From week four to six, the doe initiates the weaning process and an age of 12 weeks fawns are fully weaned (Byers 1997) but nursing has been observed as late as September. Sonoran pronghorn fawns grow rapidly in the presence of nutritious forage and adequate moisture; given those conditions, a 5 to 6-month-old is virtually indistinguishable from an adult to all but the most experienced eye (J. Hervert, AGFD, pers. comm.). Fawns are able to easily outrun even the fleetest of predators by about 45 days of age (Byers 1997).

3.5.3.1.1.1 Status and Trends

The Sonoran race of pronghorn occurs at the southern edge of the species' geographic range in some of the more hostile environmental conditions. It is probably not a coincidence that the three desert subspecies are experiencing the greatest survival problems (Yoakum and O'Gara 2000). Sonoran pronghorn require vast areas of unencumbered open range to meet their annual needs for survival and reproduction. This includes the ability to freely travel long distances between localized, seasonally sporadic rainfall events in search of sustenance. Unfortunately, Sonoran pronghorn have been extirpated from much of their historic habitat in the U.S. and Mexico, and presently occupy less than 10 percent of their suspected former range. Sonoran pronghorn are split into three subpopulations, one in southwestern Arizona, and two in northern Sonora, Mexico. The single U.S. subpopulation is effectively segregated from Mexico by an incomplete, and often cut or washed out International Boundary fence, and by Mexico Highway 2. The two Mexican subpopulations are separated by Mexico Highway 8, although this road may not be as complete a barrier as Mexico Highway 2 and the International Boundary fence.

The U.S. subpopulation currently occupies approximately 6,500 square kilometers (2,500 square miles) of federal lands in southwest Arizona, including portions of the Barry M. Goldwater Range, Cabeza Prieta National Wildlife Refuge, OPCNM, and a small area of Bureau of Land Management lands east of the refuge and west of Highway 85. The refuge lies at the heart of the Sonoran pronghorn range in Arizona, and connects locations used on the Barry M. Goldwater Range and OPCNM. Recent (1994 and later) aerial telemetry work shows that Sonoran pronghorn are most frequently found on the refuge in the valleys and bajadas of the Pinta Sands, Mohawk Valley, San Cristobal Valley, and Growler Valley.

Remains of radio collared Sonoran pronghorn believed to have died from drought stress during the summer of 2002

Photo by John Hervert, AGFD

Although probably never abundant, Sonoran pronghorn were observed in every open valley from Nogales, Mexico to Yuma, Arizona, during the course of an International Boundary survey from 1892 to 1894. Their numbers had dwindled in the U.S. by the early 20th Century. In 1907 E.A. Mearns described pronghorn by as a rare animal in the region. Nelson (1925) estimated that there were 105 Sonoran pronghorn in Arizona in 1924. Nichol (1941) estimated there were 60 pronghorn in southwestern Arizona in 1941, not including OPCNM, and Halloran (1957) reported that there were probably fewer than 100 Sonoran pronghorn in the United States in 1956. Sonoran pronghorn numbers were qualitatively estimated between 50 and 150 from 1968 to 1981. No reliable observations of Sonoran pronghorn on the Tohono O'odham Reservation have been made since 1970. Until recently, no Sonoran pronghorn have been confirmed east of Highway 85 on OPCNM since 1972. This changed when two collared Sonoran pronghorn independently crossed this highway, apparently in response to extreme drought conditions, during the summer of 2002. One of the animals returned west following the onset of rain in September 2002. The second was an apparent victim of the drought.

The U.S. subpopulation of Sonoran pronghorn is censussed in December of even years (since 1992) using an aerial line transect technique that is both statistically valid and directly comparable between years. Population estimates for 1992 to 2004 are shown in table 3.2:

Table 3.2: Sonoran pronghorn numbers 1992-2004

Date	Pronghorn seen on transects	Total number of pronghorn seen	Population estimate	95% Confidence Interval
Dec 1992	99	121	179	145-234
Mar 1994	100	109	282	205-489
Dec 1996	71	95	130	114-154
Dec 1998	74	98	142	125-167
Dec 2000	67	69	99	69-392
Dec 2002	18	18	21	18-33
Dec 2004	39	39	58	40-175

With the exception of 1994 and 2004, biennial population estimates show a downward trend. The 1994 estimate may be slightly inflated due to inconsistent survey timing. The decline in numbers from 1992 to 2002 is supported by other survey data including high adult mortality, low fawn survival and recruitment, and smaller average herd sizes.

The timing, duration, distribution, and amount of winter rains and the summer monsoon are highly variable and unpredictable from one year to the next in the arid Sonoran Desert. As a rule, winter rains tend to be widespread and gentle, allowing much of the moisture to soak into the ground and be available for plant growth. In contrast, summer monsoon rains are often localized, torrential, and large amounts lost to run-off. Fawn production and survival are positively correlated with the amount of rain received from December to March. Good winter rains create good spring "green-up" conditions, including an abundance of annual forbs that are preferred food items in the diet of Sonoran pronghorn. Body condition of late pregnancy females is a function of spring forage conditions, which in turn likely influences the number of fawns born, a doe's ability to produce milk, and how long fawns survive. Fawn survival is further enhanced by the timing, distribution, and amount of rain that falls, and is not lost to run-off, during the summer monsoon. Monsoon rains, if they fall early enough, can extend the spring "green-up" and stimulate the production of summer forbs and perennial plant growth. For example, precipitation during the winter of 2000/2001 was widespread and fell in reasonable amounts. Climatic conditions in 2001 were favorable for fawns. Recruitment of fawns (i.e., survival of fawns to reproductive age) was estimated 78 fawns recruited per 100 does in the population. Extrapolating these data indicate that about 50 fawns were added to the population in 2001, which likely resulted in a population (accounting for some adult mortality) similar to that of December 1998. Conversely, winter rains for 2001/2002 failed to materialize and it appears that recruitment of the 2002 fawn crop was negligible. Well above average winter rains in the winter of 2003/2004 and summer rains in 2004 allowed excellent recruitment of the population's 2004 fawn crop, resulting in the increased population size observed in December 2004. The year of 2005 started well with good winter and spring rains but the summer monsoon was light and there was no rain from October 15 through March, 2006. The fawn survival appeared to be good in 2005 and the population was estimated at 75 animals. Fawns born early in late February 2006 were affected by the drought but later fawns will have a good chance of surviving in 2006 as range conditions improved greatly with the March precipitation.

3.5.3.1.1.2 Habitat Requirements

3.5.3.1.1.2.1 Topography

Pronghorn are creatures of wide-open spaces where their excellent vision and uncanny running ability allow them to elude even the fastest predators. Sonoran pronghorn prefer the wide, fairly flat, alluvial valleys and basins separating the extensive system of fault block mountains on the refuge, where visibility is at a premium and their unique predator-avoidance skills are used to best advantage. These valleys are criss-crossed with an intricate network of small and large, often heavily vegetated, xeroriparian washes. Sonoran pronghorn generally use valleys during the cooler months, and whenever summer and/or winter rainfall creates favorable forage conditions. In early summer prior to the advent of summer monsoon rains, or other periods of extended drought when nutritious forage becomes scarce in valleys and open areas, pronghorn move onto bajadas surrounding the large mountain ranges. These broken, generally highly dissected areas retain more moisture than open areas. As a consequence they are typically more heavily vegetated with tree species and columnar cacti. The trade-off in these areas is poorer visibility and greater risk of predation. Certain low, wide passes through mountain ranges, such as Charlie Bell Pass and Bluebird Pass in the Growler Mountains, provide important travel corridors or shortcuts from one valley to the next.

3.5.3.1.1.2.2 Vegetation

Valley floors tend to be dominated by creosote and white bursage and vegetation diversity is low. Pronghorn use these areas extensively during wet winters when their preferred forage, annual forbs, are widespread and abundant (Hervert *et al.* 2000). Heavily vegetated desert washes are preferred habitats for pronghorn during the dry, summer season because of increased forage and as thermal cover during the heat of the day (Hervert *et al.* 2000). Common perennial plant species in desert washes include a variety of leguminous tree and shrub species (e.g., foothills palo verde, ironwood, mesquite, catclaw), cacti (e.g., saguaro), other woody plants (e.g., range ratany, burrobush, bursage), and grass (e.g., galleta). Bajadas

were used extensively in all seasons as a source of perennial browse, particularly after ephemeral forage had dried up elsewhere. Plant diversity and density is generally higher on bajadas, and green forage tends to persist longer due to more mesic conditions relative to valley floors (Hervert *et al.* 2000). Bajada vegetation gives the appearance of a mixed scrubland of trees, shrubs, and cacti, with palo verde, ironwood, mesquite, catclaw, creosote, triangle-leaf bursage, range ratany, saguaro, barrel cactus, cholla (e.g., chainfruit, staghorn, and teddy bear), and ocotillo commonly observed. (Wright and deVos 1986).

Generally, pronghorn are selective, opportunistic foragers, taking the most palatable and succulent plants available in all seasons (Authenreith 1978, Allen *et al.* 1984). The Sonoran pronghorn diet is highly variable between seasons and years, depending on forage availability (Hervert *et al.* 2000). A total of 132 plant species were detected in the diet of Sonoran pronghorn during the course of one study (Hervert *et al.* 2000). Browse and forb species were preferred food species, with browse comprising the highest percentage of pronghorn diet in all seasons except wet summers. Browse was particularly important when forbs were not available. Forbs were the main diet component during wet summers when available and succulent. Although a variety of species of cacti were taken in all seasons, use of chainfruit cholla increased significantly during dry, summer months. Grasses were not an important component of the diet except new lush growth during wet summers (Hervert *et al.* 2000).

3.5.3.1.1.2.3 Water

High density populations of American pronghorn are associated with abundant drinking water (Sundstrom 1968, Kindschy *et al.* 1978, Yoakum 1980), while low densities exist in semi-arid regions and deserts with little water (J. D. Yoakum as cited in O'Gara and Yoakum 1992). Use of free-standing water by Sonoran pronghorn, however, is not clearly understood. It has been suggested that Sonoran pronghorn do not require free water and never drink (Monson 1968), apparently meeting their moisture requirements from metabolic water and pre-formed water in the diet. A recent survey of historical records, supplemented with direct observation and photographs of Sonoran pronghorn using a variety of developed waters, conversely concluded that the species does drink from free water when it is available, at least during times of heat and water stress (Morgart *et al.* 2005)

Metabolic water is formed by the oxidative breakdown of food in the digestive tract. Certain small desert animals, such as the kangaroo rat, are known to meet all of their moisture requirements through the production of metabolic water (Schmidt-Nielsen 1979). The cost of producing metabolic water is higher in larger animals, however, in terms of moisture loss through increased respiration.

Preformed water occurs naturally in vegetation. Preformed water is not a byproduct of the metabolic breakdown of food, and is generally easily absorbed by the animal. The amount of preformed water in forage varies with the plant part, life stage, plant greenness, succulence (e.g., cacti may contain large amounts of preformed water after rains), temperature, humidity, and time of day. Fox *et al.* (2000) found that under certain drought conditions, larger Sonoran pronghorn could not meet their water requirements solely from water contained in forage plants. Furthermore, they were unable to model for requirements of Sonoran pronghorn in different physiological states, when water demands are likely greater on the animal, such as pregnancy and lactation. Preliminary investigations suggest that Sonoran pronghorn are likely able to survive using only pre-formed water in vegetation for much of the year, particularly during cooler winter months, and during periods of adequate rainfall and green forage conditions. During extended hot and dry periods, or during times of extreme drought, however, access to free water may be critical to survival (J. Hervert, AGFD, pers. comm., J. Morgart, USFWS, pers. comm.). Extreme drought occurred across all of Sonoran pronghorn range in Arizona in 2002 when 85 percent of the U.S. herd was lost.

3.5.3.1.1.3 Decimating Factors

The 1998 Final Revised Sonoran Pronghorn Recovery Plan lists lack of recruitment, insufficient forage and/or water, drought coupled with predation, barriers to movement, illegal hunting, habitat degradation from livestock grazing, diminishing size and loss of access to the Gila and Sonoyta Rivers, and human encroachment as contributing factors in the population decline of Sonoran pronghorn.

The number of pronghorn in currently occupied habitat in the U.S., estimated at 58 animals in December 2004, is critically low. The minimum size at which an isolated group of this species can be expected to maintain itself without the deleterious effects of inbreeding is not known. A population viability analysis (PVA) workshop conducted in 1996 modeled the U.S. subpopulation of Sonoran pronghorn (Defenders of Wildlife 1998). A PVA is a form of risk assessment that predicts the probability of a population going extinct under different scenarios of biological and environmental change (Scott *et al.* 1994). The PVA model using VORTEX computer software suggested that the U.S. subpopulation was at serious risk of extinction due to population fluctuations, periodic decimation during droughts (especially of fawns), small present population size, limited habitat preventing expansion to a more secure population size, and expected future inbreeding depression (Defenders of Wildlife 1998). The results of the PVA modeling exercise must be interpreted with caution because many of the population parameter inputs used to explore the risk of extinction were unknown, but arrived at by best biological judgment and consensus of participants in the workshop (Defenders of Wildlife 1998).

The Sonoran pronghorn subpopulation in the U.S. appears to be most sensitive to the number of fawns that survive to adulthood (Defenders of Wildlife 1998). Approximately 35 fawns for every 100 adult females need to be recruited each year in order for the U.S. subpopulation to grow (J. J. Hervert, pers. comm.). Fawn recruitment in Sonoran pronghorn is highly variable from one year to the next, and has only approached or exceeded this level in two out of the last 8 years (table 3.3) (Hervert *et al.* 2000; J. J. Hervert, AGFD, pers. comm.).

Table 3.3: Sonoran pronghorn fawn recruitment and rainfall

Date	No. of fawns/100 does	Average winter rainfall
December 1995	12	Above normal
December 1996	0	Below normal
December 1997	0	Below normal
December 1998	33	Above normal
December 1999	0	Below normal
December 2000	14	Below normal
December 2001	78	Above normal
December 2002	8	Below normal

Fawn recruitment is a function of forage condition which is in turn influenced by the amount and timing of rainfall. Early fawn survival is positively correlated with the amount of winter rain and is inversely correlated with the number of days between the last winter rain and the first summer rain (Hervert *et al.* 2000). Adequate winter rains are critical for the production of spring annuals. Female pronghorn depend

upon an abundance of green, highly nutritious annual forbs in the early spring for fetus development and lactation. Low quality and quantity of forage in poor rainfall years may preclude Sonoran pronghorn from producing adequate milk to keep fawns alive until weaned, generally 12 weeks or longer. Fawn data for 2003-2005 is in prep.

3.5.3.1.1.3.1 Hunting

Hunting of wild game in southwest Arizona was pervasive during the frontier period through the 1940s. Some commercial use of Sonoran pronghorn occurred in the early 1900s to feed miners, railroad workers, and other laborers in the region (Sue Rutman, NPS, pers. comm.). Hunting of Sonoran pronghorn in the U. S. was banned in the early 1920s (Wright and deVos 1986). Commercial hunting operations continued to offer illicit guided hunts for bighorn sheep and Sonoran pronghorn at least throughout the 1930s. One well known guide in Sonoyta, Mexico, was very successful at taking Sonoran pronghorn. His business was active in the 1930s and attracted clients from across the U.S. and Mexico (Sue Rutman, NPS, pers. comm.). In addition to commercial hunting pressure, residents of the Ajo-Sonoyta area hunted Sonoran pronghorn to supplement their diet (USFWS 1939, 1940, 1946a, 1946b, 1951, 1954, 1966, 1971; National Park Service 1939, 1941). Controlling illegal hunting on OPCNM and the Cabeza Prieta Game Range was one of the first management priorities when the two units were established in the late 1930s. Currently, poaching in the U.S. is not identified as an issue although it may still be a problem in Mexico (Wright and deVos 1986, USFWS 1998).

3.5.3.1.1.3.2 Domestic Livestock

Livestock grazing has the potential to alter pronghorn habitat more than any other anthropogenic activity (Leftwich and Simpson 1978, Kindschy *et al.* 1982, Yoakum *et al.* 1996), especially in the arid Sonoran Desert. Cattle and other domestic livestock were first brought to northwestern Sonora, Mexico, in 1694 by Father Kino, a Jesuit priest (Wildeman and Brock 2000). One of the more important livestock ranches established by Kino was located near present day Sonoyta, Mexico, just south of the International Border at Lukeville, Arizona. In 1702, Kino's ranch had more than 3,500 head of cattle (Officer 1993). By 1751, however, this herd had disappeared (Officer 1993). Overgrazing well into the nineteenth century caused widespread habitat changes (e.g., erosion, species composition) throughout much of the Sonoran Desert, particularly in more settled areas such as central Sonora, Mexico (Sheridan 2000). This apparently was not the case for much of southern Arizona because conflicts between settlers and Native Americans throughout the 1800s limited grazing (Sheridan 2000). American ranchers were raising livestock by the early 1900s in much of the area that would later become OPCNM (Rutman 1997) and Cabeza Prieta Game Range (CPNWR files, Ajo, Arizona). Because there was no International Boundary fence until 1947, livestock from the U.S. and Mexico ranged freely across the border (Rutman 1997). Accurate figures describing livestock numbers in the region are sparse, but Rutman (1997) cites estimates of 1,000 head of burros and horses in 1942 on the southern half of OPCNM, and as many as 3,000 cattle on OPCNM at one time. Livestock grazing and range management programs have had a greater effect on the vegetation of southeastern Arizona than any other single land use (Bahre 1991). While this relationship may not be as well documented for southwestern Arizona (Hastings and Turner 1980), it still has relevance. The BMGR was closed to livestock use in 1941 (Executive Order 8892), although trespass grazing occurred, at least sporadically, until the late 1970s (Sue Rutman, NPS, pers. comm.). Cattle were removed from OPCNM and CPNWR in 1978 and 1983, respectively (USFWS 1998). Habitat alteration (caused in part by livestock grazing) was a leading cause in the decline in Sonoran pronghorn numbers (Wright and deVos 1986).

3.5.3.1.1.3.3 Livestock-borne Disease

Little is known regarding the influence disease has on the population dynamics of Sonoran pronghorn. Extensive control of other pronghorn populations by an epizootic is uncommon (Yoakum *et al.* 1996, Yoakum and O'Gara 2000). Pronghorn in general are susceptible to a variety of bacterial, rickettsial, and viral diseases, and internal and external parasites (Jessup and Boyce 1996). Bluetongue is arguably the most

important epizootic of pronghorn (Yoakum *et al.* 1996, Yoakum and O'Gara 2000) as evidenced by a 1976 outbreak in eastern Wyoming in which at least 3,200 pronghorn died. A second outbreak in the northeastern part of Wyoming in 1984 killed at least 300 more (Thorne *et al.* 1988).

Blood samples from Sonoran pronghorn were collected during capture operations in 1997, 1998 and 2000.; and all subsequent blood samples from captures show exposures to livestock diseases. Serological examination revealed a nearly 100 percent incidence of exposure to bluetongue and epizootic hemorrhagic disease (EHD) viruses in Sonoran pronghorn (AGFD unpubl. data), which is exceedingly high compared to pronghorn exposure rates outside of Arizona (B. W. O'Gara, USFWS, Montana Cooperative Wildlife Research Unit [retired], pers. comm.). Both viruses are closely related and difficult to distinguish, and are collectively referred to as hemorrhagic disease (Thomas 1981). Exposure to bluetongue by pronghorn is widespread throughout Arizona, although actual effects on populations in the state are unclear (Heffelfinger *et al.* 1999). Livestock are the primary reservoir for the bluetongue virus and EHD (Jessup and Boyce 1996) and the likely avenue of transmission to pronghorn is by biting midges (*Culicoides* spp.). This insect breeds in damp or watery habitats (muddy areas), a condition that may only exist in Sonoran pronghorn habitat around some wildlife waters (such as charcos) or in wet years when water persists in playas and other natural collection basins for extended periods. The AGFD is currently working on collecting biting midges from Sonoran pronghorn range for disease testing (S. S. Rosenstock, AGFD, pers. comm.). Bluetongue primarily affects animals in late summer (July to September) during the peak of insect activity and coincident with the pronghorn breeding season (Heffelfinger *et al.* 1999). A viremic female may be in poor reproductive condition or her behavior altered enough to effect breeding (Heffelfinger *et al.* 1999). Viremic males may be unsuccessful in defending breeding territories or females. Other diseases tested for in Sonoran pronghorn included leptospirosis, parainfluenza 3, infectious bovine rhinotracheitis, bovine viral diarrhea, and bovine syncytial virus. All tests were either negative, or in the case of one Sonoran pronghorn that tested positive for parainfluenza 3, not a health concern at the detection level (AGFD, unpubl. data). No Sonoran pronghorn so far captured or observed (including mortality investigations) have shown any obvious clinical signs of disease (J. Hervert, AGFD, pers. comm.).

3.5.3.1.1.3.4 Predation

Coyote at developed wildlife water

USFWS Photo

Various predatory birds and mammals kill pronghorn. In general, predation on pronghorns is significant when predator numbers are high relative to pronghorn numbers (Yoakum *et al.* 1996, Yoakum and O'Gara 2000). Sonoran pronghorn habitat in the U.S. has been significantly altered, resulting in a small remaining population. Only anecdotal information exists at this time on predator numbers relative to Sonoran pronghorn; however, any predation on a severely depressed population may be significant (Errington 1956, Scott *et al.* 1994). Fawns up to 3 weeks of age are most susceptible to loss from predators (O'Gara and Yoakum 1992). Adult American pronghorn on the National Bison Range in Montana were not at risk from predation by coyotes due to their attentiveness and superior speed (Byers 1997). Conversely, coyotes were a serious predator of pronghorn fawns up to about 45 days of age (Byers 1997).

Coyote, mountain lion, and bobcat prey on Sonoran pronghorn (AGFD files, Region IV, Yuma, Arizona; CPNWR files, Ajo, Arizona). Predation generally has an insignificant effect except on small populations such as the Sonoran pronghorn (Lee *et al.* 1998). Coyotes are the most abundant large predator occurring within the habitat range of Sonoran pronghorn. In 27 mortality investigations not related to capture operations, coyotes killed at least six Sonoran pronghorn and are suspected in the death of another. Coyotes are thought to prey heavily on Sonoran pronghorn fawns as well. The evidence for this is mostly inferred, and consists primarily of several observations during aerial telemetry surveys of females with a newborn fawn(s) and one or more coyotes nearby. Subsequent surveys 1 to 2 weeks later located the female, but only one or no fawns (AGFD Sonoran pronghorn weekly radio telemetry forms, 1994-2001). Mountains lions in southwest Arizona prey mostly on mule deer (Cashman *et al.* 1992) but may kill

pronghorn when they use rugged terrain (Ockenfels 1994). Two adult Sonoran pronghorn were killed by mountain lion. Both ambush sites were located in small desert washes with trees that served as cover (L. Piest and J. Hervert, AGFD, pers. comm.). Finally, three adult Sonoran pronghorn were killed by bobcat. The actual number of adult Sonoran pronghorn killed by predators would likely be higher if cause could accurately be assigned in the deaths of 11 other animals.

3.5.3.1.1.3.5 Habitat Loss, Fragmentation, and other Anthropogenic Factors

De-watering of most of the lower Gila and Sonoyta rivers has likely caused significant habitat modification (Wright and deVos 1986), as has agricultural, urban, and commercial development. Highways, fences (e.g., rights-of-way, livestock allotments), railroads, and canals have caused habitat fragmentation. The single U.S. subpopulation of Sonoran pronghorn is effectively cut off from the two remaining subpopulations of Sonoran pronghorn in Mexico by Mexico Highway 2 and a partially fenced International Boundary.

Other factors that have the potential to directly contribute to Sonoran pronghorn mortality are highways, railroads, and canals. In June 1996, a dead, radio collared pronghorn was located approximately 400 meters (one quarter mile) south of U. S. Interstate 8. The animal had a broken femur and had been scavenged by vultures. The animal may have been struck by a vehicle on the interstate and then made its way south some distance before death (J. Hervert, AGFD, pers. comm.). Sonoran pronghorn were regularly seen along and east of Arizona Highway 85 many years ago (USFWS 1998). With the exception of an adult doe observed on the right-of-way of Arizona Highway 85 at the north end of Crater Range in June 1996 (R. Barry, USAF, pers. comm.) and two does that independently crossed the road on OPCNM during the extreme drought of 2002, contemporary (within the last 30 years) confirmed observations are lacking. Unconfirmed reports of Sonoran pronghorn crossing Mexico Highway 8 are occasionally received from residents of Puerto Peñasco (J. L. Bright *et al.,* AGFD, unpubl. data), although no Sonoran pronghorn from previous radio collar studies in Mexico have ever been recorded crossing this road (R. Paredes, IMADES, pers. comm.). An adult male pronghorn was struck and killed by a vehicle near kilometer post 29 on Mexico Highway 8 in July 1996. Two Sonoran pronghorn have been pulled from the Welton-Mohawk Canal on the northern end of their range (CPNWR files, Ajo, Arizona). The potential for injuries and deaths from highways, railroads, and canals remains a concern and the influence to the population from accidents could be significant (Defenders of Wildlife 1998).

The BMGR is the nation's third largest military reservation for air-to-air and air-to-ground gunnery training. It is a national security asset for developing and maintaining the aerial combat readiness skills of tens of thousands of pilots since 1941. The airspace above CPNWR is under the jurisdiction of the Air Force for the eastern portion , and the Navy for the west portion. Military activities in pronghorn habitat on and above the BMGR and above CPNWR include such things as airspace use by jets and helicopters (primarily daylight although night time missions are run), manned air-to-ground ranges, tactical air-to-ground target areas, auxiliary airfields, explosive ordnance disposal/burn areas, ground support areas, and military use roads(USFWS 1996,1997). Air-to-ground ordnance delivery no longer occurs on the refuge. However, direct death or injury to pronghorns could occur as a result of ordnance deliveries, other objects falling from aircraft, spent shells, live rounds, aircraft crashes, or collisions with ground vehicles on BMGR. Potential impacts of normal ordnance deliveries are limited to manned and tactical ranges. On manned ranges and most areas of tactical ranges, ordnance is limited to strafing and practice bombs and rockets. High explosive delivery is limited to small areas on each tactical range. Numerous targets throughout the tactical ranges receive various degrees of strafing. Pronghorn are also exposed to some indirect impacts of military activities, primarily noise and visual, from low-level aircraft over flights, ordnance delivery, and vehicle and foot traffic. Two other military activities have potential significance for Sonoran pronghorn. Explosive Ordnance Disposal (EOD) personnel collect and destroy dangerous unexploded munitions on tactical ranges and other developed target areas. The EOD clearances occur annually on tactical ranges (and more frequently elsewhere) and can take up to several weeks. During range clearances, large six-wheeled trucks are driven in the required clearance zones around target areas at intervals ranging from 15 to 50 meters (50 to 165 feet) searching for ordnance items. Some desert vegetation is unavoidably crushed during these

operations and pronghorn may avoid the areas due to the activity and noise (USFWS 1997). The USMC conducts the Weapons and Tactics Instructor Course (WTI) twice a year (March-April and October-November). During the five days of a typical WTI course, one flight per day of two to eight helicopters (65 to 100 meters [215 to 330 feet] apart) traverse CPNWR within established flight corridors. They continue to target areas on the BMGR north and east of the refuge where they may deliver ordnance to target areas (USFWS 1996). Some ground-based activities in association with WTI exercises occur in pronghorn habitat (USFWS 1996). Finally, Sonoran pronghorn may also be affected by potential contaminant issues, such as high levels of aluminum in the soil and vegetation on BMGR and the refuge (USFWS 1997). Overall, it is determined that "there is a net benefit to endangered species from the presence of the Goldwater Range and the mitigation measures that have been put in place by the military" (2004 National Defense Authorization Act congressionally appointed BMGR endangered species task force).

The BLM, BMGR, CPNWR, and OPCNM have public use programs for lands under their jurisdiction. Types of use (e.g., season of use, duration of stay, activities engaged in) vary somewhat for each area, with highest visitation rates centered on the cooler months and unpredictable but popular "wild flower" events that occur in spring and early summer.

Approximately one third of the BMGR is regularly restricted from recreational access (including manned ranges, tactical ranges, and Moving Sands/Cactus West Target Complex) (U. S. Department of the Navy 2001). Visitation on the USAF portion of BMGR is currently restricted to the Sauceda Mountains area east of Highway 85 and outside of currently occupied Sonoran pronghorn habitat. The USAF occasionally issues special use permits to bighorn sheep tag holders to access the Mohawk, Granite, and northern Growler mountains during December on no-fly weekends (R. Barry, USAF, pers. comm.). Current Sonoran pronghorn habitat most frequently visited by recreationists on the USMC side of the BMGR includes open areas of the Mohawk Valley between the Copper and Mohawk mountains (U. S. Department of Defense 2001). The entire CPNWR (348,046 hectares or 860,010 acres) is open to recreational access. Ninety-three percent of the refuge is Wilderness and is closed to vehicle entry. The El Camino del Diablo, Christmas Pass, and Charlie Bell roads are designated corridors not included in Wilderness that allow vehicle access by the public to remote areas of the refuge. A hold harmless permit is required for all visitors to BMGR and CPNWR. OPCNM (133,830 hectares or 330,689 acres) is entirely open to visitors and is approximately 95 percent designated Wilderness. Developed facilities for public use include the visitor center near Lukeville, Arizona, one remote primitive camping area, one developed campground, and approximately 160 kilometers (100 miles) of graded dirt scenic roadways (T. Tibbitts, NPS, pers. comm.). Habitat frequented by Sonoran pronghorn on OPCNM only occurs west of Highway 85 at this time. BLM lands that provide habitat for Sonoran pronghorn primarily occur east of CPNWR and west of Highway 85. Public use in these areas generally consists of primitive camping in recreational vehicles by winter visitors. Camping stays on BLM lands are limited to 14 days.

Although recreational permits are required to access BMGR, CPNWR, and the back country of OPCNM, compilation of visitor use data is not easily standardized. No visitor use statistics are collected for the affected BLM lands (D. Carpenter, BLM, pers. comm.). Based on the number of hold harmless permits issued out of the CPNWR office, on average, visitor use of the region is on the rise, with sharp increases in "wild flower" years (V. Harp, USFWS, pers. comm.). For example, on CPNWR a total of 258 visitor permits were issued in 1992 for an estimated total of 2,277 user days. In 2000, 1,447 permits were issued out of the refuge office for an estimated total of 4,630 user days. Visitor use spiked in 1998, a good "wild flower" year, with 7,021 user days (V. Harp, USFWS, pers. comm.). Increasing visitor use of the region, particularly in back country areas, increases the potential for visitor/pronghorn interactions.

The number and frequency of undocumented aliens and drug smugglers illegally entering the U. S. on foot and by vehicle from Mexico along the southern boundaries of OPCNM, CPNWR, and the far western reaches of the BMGR has increased dramatically since January 2000 (even during the hot, dry summer months when the number of entries typically decrease). The majority of crossings occur at night, and primary travel routes are up broad valleys, across bajadas, and through mountain passes frequented by

Sonoran pronghorn. In one area, illegal traffic has created a 61 kilometer (38 mile) road since 1999 that traverses pronghorn habitat. In addition, there are hundreds, and perhaps thousands, of additional kilometers of single vehicle tracks laid down across the otherwise undisturbed desert by undocumented aliens and drug smugglers seeking new routes or to escape detection. This increase is partly a consequence of stepped-up enforcement activities by immigration authorities in urban areas along the border (e.g., Sonoyta, Douglas, Yuma). As an illustration of the scale of the problem, in 1997, 1998, 1999, and 2000, a minimum of eight, four, six, and 11, respectively, abandoned or confiscated vehicles used for smuggling UDAs were removed from CPNWR. By comparison, nine vehicles were removed in just the first three months of 2001, with an additional seven remaining in the desert (L. Williams, CPNWR, pers. comm.). The number of known (i.e., interdicted) UDAs that crossed the west half of CPNWR averaged 2,800/year from 1997 to 2000. For the first 5 months of 2001, this figure was 2,200 (Welton BP Station, unpubl. data; V. Harp, CPNWR, pers. comm.). These numbers are representative of only one portion of the current range of Sonoran pronghorn and it is a certainty that many more vehicles and individuals pass through undetected than are reflected in official tallies (based on vehicle and human tracks, other sign, sensor hits, unsuccessful pursuits by law enforcement officers, and reports by agency employees and visitors).

Increased illegal border crossings have resulted in stepped-up law enforcement activities (e.g., more officers and vehicles, increased patrolling and interdictions) with their own set of potential impacts to Sonoran pronghorn. Officers from the BP, U. S. CBP-BBP, Drug Enforcement Agency, NPS, BLM, USFWS, and County Sheriff Departments (Pima, Maricopa, and Yuma) are all charged with enforcing specific components of State or federal law. In addition, the USAF and USMC have their own security forces tasked with patrolling the BMGR and they can detain unauthorized entrants on the military range or alert other law enforcement entities to their presence. Activities performed in pronghorn habitat by the various law enforcement agencies include: routine surveillance (e.g., periodic fixed-wing flights by CBP and daily helicopter flights by the BP, placement and maintenance of sensors, foot and vehicle patrols, and temporary and semi-permanent check stations such as the one located in the O'Neill Hills on the refuge); roadblocks and hot pursuit chases; detention, arrest, and transport of undocumented aliens and smugglers; search and rescue operations; and removal of abandoned/confiscated vehicles and other contraband. In addition, different agencies periodically conduct joint field operations with large numbers of law enforcement officers (sometimes in cooperation with the Army National Guard and their helicopter units) that specifically target high traffic areas. By policy, memorandum of understanding, and/or informal agreement, use of vehicles by law enforcement officers on federal lands is generally confined to established roadways (including public use corridors and administrative trails in wilderness areas on OPCNM and CPNWR). However, during emergency situations (e.g., hot pursuit chases, search-and-rescue operations) these restrictions are often disregarded. As more law enforcement assets are deployed along the remote stretches of the Mexican border in southern Arizona and apprehensions increase, the number of attempted illegal entries through pronghorn habitat in the U. S. will likely decrease, with the undocumented aliens and smugglers shifting their activities elsewhere, at least temporarily. This trend could reverse itself sometime in the future, in an ongoing cycle, if law enforcement assets are redeployed to other "hotspots" and it becomes known that this area of the border is once again patrolled less.

3.5.3.1.1.3.6 Long-Term Climate Change

Some current analyses of climate in the southwestern U.S. show an overall trend of increasing temperatures, increasing and higher intensity rainfall, and shorter duration of snow pack cover. The causes for climate change are both natural and human-induced, particularly since the advent of the industrial age. The current climate is an interglacial period, the driest and warmest period to occur during the last 32,000 years. Over the last century, average temperatures in the southwest have increased by 1 to 1.5 degrees Centigrade (2 to 3 degrees Fahrenheit). Temperatures during the late 1990s approached the record-breaking temperatures that occurred in the 1890s. Even more rapid warming is occurring in northern Sonora, Mexico. The 1990s have been one of the warmest decades on record across the globe, potentially the warmest since the 1400s. Precipitation has also moderately increased over the last century, but less so in the Southwest than other parts of the U.S., and Southern Arizona appears to be experiencing declines.

Greater frequency of summer drought will likely increase the rate of shrub invasion in the southwest, and some attribute the ongoing expansion of creosote in southern Arizona to recent climate change. Periods of drought and "wet" years appear to be cyclical. It is unquestionable that the refuge and surrounding area are in a long cycle of relative drought. This drying trend for the region will likely have significant ramifications on the amount and duration of water that is captured and stored in current natural catchments and developed waters, and the composition and availability of preferred forage for Sonoran pronghorn.

3.5.3.1.1.4 Recovery Objectives

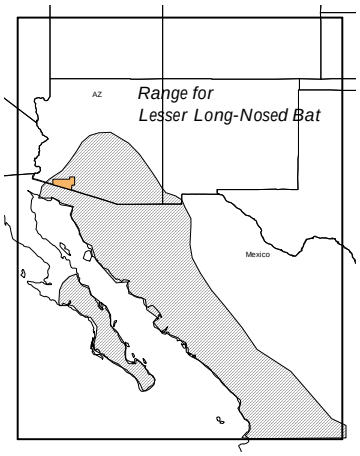
Maintaining genetic diversity is a major Sonoran pronghorn management concern, in terms of defining realistic population goals and recovery objectives, relative to carrying capacity of available habitat. A Population Viability Assessment Workshop held in 1996 estimated that at least 500 animals were necessary to maintain genetic diversity of 95 percent of the pronghorn population being modeled at that time (Defenders of Wildlife 1998). When modeled at fewer than 500 animals, most scenarios resulted in maintaining less than 90 percent genetic diversity. A population of at least 300 pronghorn was necessary to ensure long-term survival, albeit with some loss of genetic diversity. The risk of extinction accelerates rapidly when the population drops well below 100 animals (Defenders of Wildlife 1998); a situation the Sonoran pronghorn currently faces.

Recovery criteria for the Sonoran pronghorn are detailed in the Final Revised Sonoran Pronghorn Recovery Plan (USFWS 1998). The Sonoran pronghorn will be considered for reclassification from endangered to threatened when:

1. There are an estimated 300 adult Sonoran pronghorn in one U.S. population and a second separate population is established in the U.S. and remains stable over a 5-year period, or

2. Numbers are determined to be adequate to sustain the population through time.

Provisions for delisting the species are not detailed in the recovery plan (USFWS 1998) due to the nature and significance of current threats (e.g., lengthy and recurring dry seasons, long-term and perhaps irreversible habitat changes brought about by past overgrazing and continued global warming, explosive increase in illegal across-the-border activities, habitat fragmentation), unknown elements of Sonoran pronghorn life history and habitat requirements (e.g., seasonal need for free water, effects of an aging reproductive component, fawn survival, the differential role of predation on adults and young), uncertainty of availability of suitable reintroduction sites and animals for transplants, resistance to management actions on wilderness and other areas of the public lands (e.g., forage and water enhancement, habitat manipulation, predator control), and continuing uncertainty in the long-term stability and status of subpopulations in Mexico. In reality, the Sonoran pronghorn may not be fully recoverable. Based upon current research, the USFWS believes ongoing recovery efforts will in the short-term lead to downlisting the Sonoran pronghorn from endangered to threatened, and in the long-term, contribute to the delisting of the species. Tasks necessary to accomplish reclassification from endangered to threatened, as detailed in the Recovery Plan (USFWS 1998) should provide the information necessary to determine if and when delisting will be possible and what the delisting objectives and criteria should be.



3.5.3.1.2 Lesser Long-Nosed Bat *(Leptonycteris curasoae yerbabuenae)*

This migratory yellowish-brown or gray bat was listed as Endangered in 1988. It is distinguished by its elongated muzzle, small noseleaf, long tongue, and minute tail that appears to be missing. Known to roost in caves and abandoned tunnels below 1,830 meters (6,000 feet) MSL, they forage at night on nectar, pollen, and fruit of agaves and columnar cacti.

3.5.3.1.2.1 Distribution

Lesser long-nosed bats are present in Arizona from April to September, spending the remainder of the year in Mexico from southern Sonora southward. A single young is born in mid-May. When young are able to fly, adults and young move to higher elevations to feed on agave nectar. The Recovery Plan was completed in 1994. Although there is controversy among bat experts, the recovery plan suggests there may be as many as 60,000 individuals that reside and feed in the southwestern U.S. (Arizona and New Mexico).

The maternity roost on the refuge is one of three known major maternity roosts in the U.S. The other two maternity roosts are located on other federal and tribal lands east of the refuge. The largest roost is used by approximately 20,000 adult females, the other two sites host up to 4,000 adult females each. A short distance south in Mexico, the Pinacate Biosphere Reserve contains a maternity roost of 100,000 bats. A few lesser long-nosed bats have also been found inhabiting smaller roost sites on the refuge. Surveys of potential roost sites within the refuge are ongoing.

The lesser long-noised bat appears to use two migration routes. An early spring route connects maternity colonies in coastal Sonora and southwestern Arizona and Jalisco via the west coast of Mexico. The route used later in the season connects transitory roosts in southeastern Arizona with winter range via a path along the foothills of the Sierra Madre.

3.5.3.1.2.2 Habitat Requirements

Critical resources include suitable day roost sites and nearby extensive populations of columnar cacti and agaves. Criteria for suitable maternity roosts have not been identified as the conditions vary. Lesser long-nosed bats may occupy caves or mine shafts with other bat species but will occupy deeper sections. Maternity roosts are usually warm and poorly ventilated. Since all caves and mines are potential roost sites, they need to be evaluated before closing entrances that might prevent bat entry.

Lesser long-nosed bats are the major pollinators of columnar cacti and paniculate agaves and a potential seed disperser of columnar cacti which are distinctive elements of the flora of the Sonoran Desert. Their core diet is made up of nectar, pollen, and fruit of two columnar cacti and three species of agave in Arizona. They are highly mobile, foraging long distances, for up to 6 hours a night, visiting over 100 flowers per night. Refuge adult bats commuted an average of 13.8 kilometers (8.6 miles) to feeding areas when food was plentiful, and 17.6 kilometers (10.9 miles) when food is scarce.

3.5.3.1.2.3 Reasons for listing

- Long term decline in populations
- Recent reports of its absence from previously occupied sites
- Decline in the pollination of certain agaves
- Concern about death of an ecosystem if these bats are absent

Many of these early indicators have been brought into question by more recent research and the Recovery Plan determined criteria for down listing after

- Each major roost site is monitored annually for 5 years;
- Results of the monitoring indicate the population is stable or has increased;
- Sufficient progress is made in protecting roost sites and forage from disturbance or destruction;
- No new threats to the species, its roost or foraging habitats have been identified and current threats have not increased significantly; and
- The Service determines the species is no longer endangered.

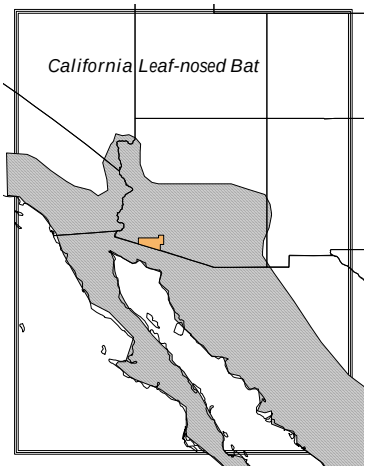
3.5.3.1.2.4 Recovery Efforts

Since most of the roost sites and forage plants are currently protected, recovery efforts included:

- Protection of all known roost sites and food plants within 81 kilometers (50 miles) of known roost sites.
- Monitoring known roost sites for 5 years.
- Continued survey for unknown roost sites.
- Development of public education/information on beneficial aspects of bats.
- Research census techniques, physical requirements for roosts, foraging ranges and other life history questions.

3.5.3.2 Species of Conservation Concern

3.5.3.2.1 California Leaf-nosed Bat (*Macrotus californicus)*



The well developed wedge-shaped noseleaf and large ears joined at their base identify this bat found below 1,220 meters (4,000 feet) MSL. They are a tropical species that never evolved the ability to hibernate and are resident and active year round. The colony spends the day in caves or mine tunnels leaving on warm nights to feed on insects. Mating occurs in the fall with a single young born in June. Food consists primarily of insects gleaned from vegetation or the ground. Water requirements are unknown. Some winter studies in California and along the Bill Williams River in Arizona have shown these bats do not use free water, however studies at OPCNM (Cockrum 1981) netted bats at water sources.

It is believed that the current distribution may be a recent development due to mining activity, which expanded roosting and maternity sites. Prior to mining California leaf-nosed bats were migratory in southwestern deserts. Maternity and all winter roosts in Arizona and California are located in abandoned mines (Dalton and Dalton 1994). They select roosts with a mean monthly temperature range of 24-32 Celsius (75-90 degrees Fahrenheit). And 32-56 percent relative humidity. Recapture results at the refuge indicate there is a single intermingling population in the Aqua Dulce Mountains. The primary known winter roost site at the refuge is Papago Mine. Individuals roosting in Cowboy or Bighorn mines showed a preference for foraging at Jose Juan Charco (in Summer) at least 10 kilometers (6 miles) distant. There is some evidence of sexual segregation among roost sites.

Bats are sensitive to disturbances and therefore need both protection and alternate sites. The sites at Cabeza Prieta are important because of the absence of mining and urban development.

Desert bighorn sheep on Cabeza Prieta Refuge

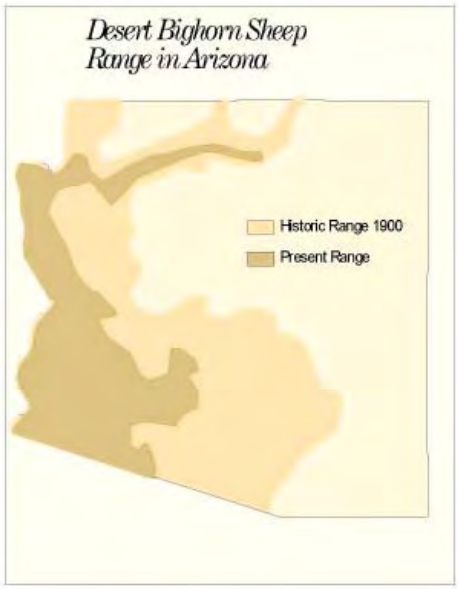
USFWS Photo

3.5.3.3 Desert Bighorn Sheep (*Ovis canadensis mexicana)*

Bighorn sheep (*Ovis canadensis*) range across much of western North America, occupying open, mountainous habitat in southwestern Canada, western U.S., and northwestern

Mexico (Manville 1980). They are relatively short-legged, stocky animals (Hansen 1980), ideally proportioned to negotiate the rugged, mountainous terrain that they prefer. Both sexes have horns, although they are much smaller in females. Horns are comprised of a boney core, covered with a horny sheath (Hansen 1980). Unlike those of Sonoran pronghorn, desert bighorn sheep's horn sheathes are permanent and not shed every year. The male's massive horns "curl" outward from the head. A large ram is a highly desired hunt trophy.

Four subspecies of bighorn sheep (and certain populations of two other races) occupy arid, desert mountain ranges in the southwest U.S. and northwest Mexico and are collectively known as "desert" bighorn sheep (Manville 1980). Desert bighorn sheep, in general, weigh less, are lighter in color, and have less heavy coats than their more northern relations. The Mexican race of desert bighorn sheep (*O. c. mexicana*) occurs on the Cabeza Prieta National Wildlife Refuge.



Desert bighorn sheep are uniquely adapted to cope with hot, dry environments. A review of the literature by Hansen (1982) indicated this may include a variety of behavioral and physiological adaptations such as: concentrating urine and removing much of the moisture from feces before elimination; rehydrating quickly upon visiting a water hole after going several days without drinking during the hottest times of the year and; absorbing water from the gut into the blood stream rapidly (and withstanding the resultant osmotic stress to the red blood cells); tolerance of high plasma concentrations and lower susceptibility to hemolysis (red blood cell breakdown) as dehydration proceeds; avoiding heat gains by minimizing activity and judicious use of shade during the heat of the day; lighter-colored coat; reduction of conductive heat gains through the legs by selective fatty acid deposition in bone marrow; a network of carotid vessels that cools the blood just before entering the brain; and timing and duration of reproduction.

The desert bighorn sheep is a wilderness-dependent species (Hendee and Dawson 2002) and, more than any other wildlife species in the desert southwest, is emblematic of wilderness and wild places. Intolerant of many human activities, this hardy species has been severely reduced or even extirpated from much of its former range, including the Pusch Ridge Wilderness Area outside of Tucson, Arizona.

3.5.3.3.1 Status and Trends

Few historic records exist that allow for a meaningful assessment of pre-settlement bighorn sheep numbers in North America, Arizona (Russo 1956, Monson 1980, Brown 1993) or the refuge. Seton (1929) estimated there were 1.5 to 2 million bighorn sheep in North America prior to the arrival of European man. Buechner (1960) reviewed the status of the species and estimated that by the late 1950s, there were as few an 25,000 bighorn sheep in North America (a reduction of more than 98 percent in numbers). The decrease in desert bighorn sheep numbers and reduction in amount of habitat occupied in Arizona is consistent with the continental decline of bighorn sheep (Brown 1993, deVos 1993).

Due to the early (pre-1900) and rapid decline of desert bighorn sheep in Arizona, reliable information on historic numbers and distribution of the species does not exist. Early surveys and anecdotal reports indicate that desert bighorn sheep were likely present in most of the desert mountain ranges across western, southwestern, and southern Arizona in the early 1800s (Brown 1993). By 1893, however, the decline in desert bighorn sheep populations in Arizona was so great that the Territorial Legislature passed a 5-year closure on taking the species (Brown 1993). By the early 1900s, bighorn sheep had been extirpated from large areas of the state and were only found in reasonable numbers in southwestern Arizona and the

Grand Canyon (Brown 1993). In 1937, a statewide inventory estimated that as few as 700 bighorn sheep remained in Arizona outside of the Grand Canyon and Lake Mead areas (Nichol 1937). Establishment of the Cabeza Prieta and Kofa Game Ranges in 1939 was prompted by the Arizona Game Protective Association, the Boy Scouts of America, and a number of individuals to save the desert bighorn sheep from extinction. At the time of establishment, the Cabeza Prieta Game Range was considered to be one of the last strongholds of the species in the state with a remnant population of 50-100 bighorn sheep.

Prior to 1955, information on desert bighorn sheep numbers on Cabeza Prieta is limited to anecdotal accounts. From 1955-1997, the refuge conducted summer water hole surveys for desert bighorn sheep. These surveys provided an interesting, if subjective, snapshot of bighorn sheep behavior, body condition, and use of water holes. Water hole count data were too variable, however, to be useful in terms of providing reliable population estimates for individual mountain ranges or the refuge.

In March 1968, the first helicopter survey for desert bighorn sheep on the refuge was flown, and spring surveys continued to be flown intermittently through 1980. These surveys were inconsistent in terms of types and numbers of helicopters flown, personnel, time spent surveying, and areas surveyed. The data gathered provided useful information on total numbers observed, distribution, and age/sex, ram: ewe and lamb: ewe ratios, but were of little value in deriving an objective estimate of total bighorn sheep numbers on the refuge.

Beginning in 1982, helicopter surveys were switched to the fall in an attempt to provide better data on which to base population estimates. A refuge employee at the time remarked that "Ultimately what we achieve in a survey such as this is an index rather than an opportunity to project population numbers." This survey was conducted in the same fashion in 1984 and 1985, but once again was unsatisfactory (in terms of providing quantifiable population estimates) for many of the same reasons as surveys performed from 1968-80.

In 1986, the AGFD, in cooperation with the Service, embarked on a 3-year study to further refine helicopter survey procedures in order to develop a repeatable, objective survey protocol that allowed for statistically valid comparisons between years. Annually, from 1986 to 1990, portions of desert bighorn sheep habitat on the refuge were flown in a standardized, systematic fashion. A group size sensitive estimator (95 percent confidence intervals) was used to derive population estimates. Population estimates for the portions of bighorn sheep habitat surveyed on the refuge during this period ranged from approximately 170 to 250 animals (AGFD, Yuma Region, unpublished data). These values were not extrapolated across the refuge, however, and are only representative of those portions of the refuge actually surveyed (approximately 33-50percent depending on the year).

Following the 1990 survey, it was decided that the survey would only be conducted once every three years. The rationale behind this decision was that it was more instructive to conduct a more extensive, "complete" survey less often, versus an annual "partial" effort (Bob Henry, AGFD, pers. comm.). A survey of this frequency still allows managers to use reasonably current information for determining annual hunt recommendations. Conversely, a sharp population decline or increase in non-survey years would not be detected. With the exception of a few minor modifications, the refuge desert bighorn sheep population survey has been conducted in a consistent fashion every third year from 1993 to 2005.

When only the same areas of the refuge flown from 1986-1999 are compared, the data suggest a growing bighorn sheep population from 1986 on, peaking in 1993, and declining thereafter. This is consistent with the 1993 - 2002 full data sets which also show a steady decline from a high of 480 in 1993 to a low of 323 in 2002 (table 3.4) (Bob Henry, AGFD, pers. comm.). This decline in numbers is particularly high on the east side of the refuge (Game Management Unit 46A).

Table 3.4: Population estimates for desert bighorn sheep (95 percent confidence interval)					
Range	**1993**	**1996**	**1999**	**2002**	**2005**
Growler Mountains	90 (65-168)	60 (43-113)	55 (38-107)	59 (43-103)	43. (30-84)
Agua Dulce Mountains	35 (23-86)	45 (30-96)	31 (22-59)	19 (15-30)	22 (16-38)
Granite Mountains	50 (34-104)	15 (10-32)	8 (6-14)	16 (11-33)	34 (26-51)
Childs Mountain	8 (6-14)	Not flown	18 (12-39)	6 (4-13)	7 (6-9)
Antelope Hills	2 (1-6)	Not flown	Not flown	Not flown	0
Total 46A	**186 (129-377)**	**120 (83-241)**	**113 (79-219)**	**100 (73-178)**	**106 (78-182)**
Cabeza Prieta Mountains	100 (68-213)	103 (71-208)	97 (67-191)	101 (70-209)	111 (78-219)
Tule Mountains	30 (22-49)	21 (14-45)	27 (19-53)	12 (8-26)	5 (3-12)
Sierra Arida	13 (8-26)	7 (6-9)	Not flown	0	Not flown
Sierra Pinta	119 (83 -232)	102 (71-203)	102 (75-181)	87 (61-168)	100 (59-203)
Bryan/Mohawk Mountains	33 (23-61)	56 (41-95)	43 (31-75)	22 (16-40)	25 (18-42)
Total 46B	**293 (205-581)**	**288 (202-560)**	**269 (192-500)**	**223 (156-443)**	**241 (158-476)**
Total Cabeza Prieta NWR	**480 (334-958)**	**408 (285-801)**	**381 (271-718)**	**323 (228-621)**	**348 (236-658)**
Note: some column totals are apparently incorrect due to rounding errors.					

3.5.3.3.2 Habitat Requirements

Topography – Desert bighorn sheep prefer rough, rocky, broken terrain with clear fields of view, and adequate escape cover. Bighorn seek the shade of vegetation, overhanging cliffs, and even caves to avoid inclement weather, the heat of the day, and survey aircraft. Bighorn typically don't run far, but instead depend on their agility and hiding ability to elude predators. Lambing and early lamb-rearing usually, but not always, occurs in the roughest terrain. Bighorn sheep habitat on the refuge is characterized by distinct mountain ranges separated by wide valleys. Some movement between mountain ranges occurs; however, it is thought to be less than on areas with more continuous habitat such as occurs on Kofa National Wildlife Refuge.

Vegetation – Desert bighorn sheep detect predators and other dangers primarily through vision and thus avoid potential predator ambush sites such as areas of dense vegetation. Bighorn are highly adaptive and opportunistic feeders, using a wide variety of plant species, including grasses, forbs, browse, and cacti (Russo 1956, Browning and Monson 1980, Morgart 1990, Dodd 1993). Forage selectivity appears to be largely a function of availability, plant condition, and season of year. Although little work has been done on

the dietary preferences of desert bighorn sheep on the refuge, some general observations of seasonal use of important forage plants are possible. Annual forbs that grow in the spring and summer in response to winter rains and the summer monsoon are avidly taken while lush and green. Grasses such as big galleta, bush muhly and grama are taken heavily in the spring and early summer when green and growing. The green leaves and new shoots of woody species such as Mormon tea, ocotillo desert thorn, and range ratany are used throughout the year when available. New shoots, leaves, and beans of leguminous desert wash species such as catclaw, littleleaf palo verde, ironwood and mesquite are especially important when other perennial and annual food sources have dried up. In early spring, the buds and flowers of brittlebush are actively sought out. Mistletoe, which parasitizes palo verde and ironwood in particular, is apparently eaten throughout the year. Finally, several species of cacti, such as saguaro and barrel cactus are also readily taken throughout the year, especially during dry periods and drought (Browning and Monson 1980).

Water – Water is absolutely essential to the survival of all wildlife (Ballard *et al.* 1988), and is especially critical for desert-dwelling species such as the desert bighorn sheep (Schmidt-Nielsen 1979, Turner and Weaver 1980). Heat dissipation and maintaining a positive water balance are two of the greatest challenges facing desert-dwellers. Water is required in a number of interrelated physiological processes including maintaining a suitable body temperature. Although desert bighorn sheep can temporarily withstand some level of dehydration (Turner and Weaver 1980), over time water gain must balance water loss. Desert bighorn sheep lose body water through respiration and evaporation, and in their feces and urine. Loss of water through respiration and evaporation increases with increasing ambient air temperature. Conversely, desert bighorn sheep may be able to concentrate their urine (Bradley and Allred 1967, Horst 1971) and reabsorb much of the water from their feces during periods of heat stress (Turner and Weaver 1970). Desert bighorn sheep are able to obtain water from three sources: metabolic, preformed, and free (Schmidt-Nielsen 1979, Turner and Weaver 1980).

Metabolic water is formed by the oxidative breakdown of forage in the digestive tract. Certain small desert animals, such as the kangaroo rat, are known to meet all of their moisture requirements through the production of metabolic water (Schmidt-Nielsen 1979). The cost of producing metabolic water is higher in larger animals, however, in terms of moisture loss through increased respiration. Animals as large as desert bighorn sheep cannot subsist on metabolic water alone (Schmidt-Nielsen 1979, Turner and Weaver 1980).

Preformed water occurs naturally in vegetation. Preformed water is not a byproduct of the metabolic breakdown of forage, and is generally easily absorbed by the animal. The amount of preformed water in forage varies with the plant part, life stage, plant greenness, succulence (e.g., cacti), temperature, humidity, and time of day. Desert bighorn sheep can go long periods without drinking during cooler months (Monson 1958, Simmons 1964, Wilson 1971) and at other times of the year when there is an abundance of lush, green forage. During cooler months, heat loading is reduced and less water has to be expended by the animal for cooling. In addition, when abundant green forage is present, desert bighorn sheep appear to be able to maintain water balance entirely on preformed and metabolic water in the diet. Conversely, during the hot, dry summer months and extended periods of drought, when preferred forage species are dead, dried out, and/or dormant, it is unlikely that desert bighorn sheep can survive for an extended period of time solely on metabolic and preformed water from grass, forbs, and woody species. This would be especially true for animals such as lambs and lactating ewes. Cactus has been variously reported to be an important component in desert bighorn sheep diet, at least seasonally (Dominguez 1976, Morgart 1990) and has been suggested to explain how some desert bighorn sheep populations survive years of severe drought (Turner and Weaver 1980). When some cacti become dehydrated, however, the water required by desert bighorn sheep to void ingested electrolytes and dry matter is greater than the water obtained from eating the cactus (Turner and Weaver 1973). Desert bighorn sheep forced to depend only on cacti for their water needs are likely to be in a condition of water deficit. Furthermore, as a state of dehydration continues, the animal restricts forage intake since the process of digestion requires water. A combination of dehydration and starvation causes animals to weaken over time. Weakened animals are more susceptible to disease and other stress-induced mortality factors. The very young, old, sick, and lame are least capable of maintaining an adequate water

balance for survival under these conditions and generally succumb first. Saguaro (Russo 1956, Simmons 1969) and barrel cactus (Jimmy Cain, University of Arizona, pers. comm.) are commonly fed on by desert bighorn sheep on Cabeza Prieta National Wildlife Refuge, particularly during the hot, dry summer months.

Desert bighorn sheep readily use free-standing water, particularly during hot, dry summer months, extended periods of drought, and vegetation dormancy. Naturally occurring, free-standing water is an uncommon, usually ephemeral commodity in the Sonoran Desert, and is only sparsely distributed across the Cabeza Prieta National Wildlife Refuge. Water developments have been the primary habitat manipulation technique employed for managing desert bighorn sheep populations on the refuge and elsewhere in the arid southwest. Free-standing water in sheep habitat on the refuge occurs in temporary pools of rain, unmodified natural tanks (e.g., Sheep, Tres Hombres), modified natural tanks (e.g., Cabeza Prieta, Heart), developed tanks (e.g., Sierra Pinta , Eagle), and windmill-fed troughs (e.g., Charlie Bell Well). The only known spring on the refuge, Agua Dulce, is no longer viable. Tanks on the refuge (both natural and developed) capture and store run-off. Water collection efficiency, storage capacity; and retention times (both within and between tanks), are highly variable from one year to the next. These variables are functions of: size of watershed; distribution, duration, and intensity of rainfall; tank sedimentation and flushing (if any) rates; tank volume; time, direction, and duration of exposure to the sun; ambient air temperature and relative humidity; exposed water surface area; wind direction, speed, and frequency; shade (natural or constructed); and amount of wildlife and illegal human use. Tanks may periodically require water hauling (via truck or helicopter) during periods of extended drought and/or heavy wildlife use.

The availability of free water is generally considered to be an important habitat requirement for desert bighorn sheep (Rosenstock *et al.* 1999). However, some populations of desert bighorn sheep (i.e., Big Hatchet Mountains, New Mexico; Little Harquahala Mountains, Arizona) are thought to persist in the absence of free water (Watts 1979, Krausman *et al.* 1985, Alderman *et al.* 1989). In both instances, however, an abundance of cacti was suggested as a potential source of pre-formed water in the diet that may have offset water demand. Conversely, water developments have been shown to increase numbers and/or expand the range of desert bighorn sheep populations in other locations (Leslie and Douglas 1979). Also, the drying of natural springs was directly implicated in the decline in bighorn sheep numbers and reduction of distribution on Death Valley National Monument (Douglas 1988).

3.5.3.3.3 Decimating Factors

It is undeniable that desert bighorn sheep have suffered huge reductions in numbers and distribution across their range relative to historic levels. This decline was so great, and concern for the long-term welfare of the species so high, that four federal wildlife refuges (known today as the Cabeza Prieta National Wildlife Refuge, Desert National Wildlife Range, Kofa National Wildlife Refuge, San Andres National Wildlife Refuge) were established in the mid 1930s to early 1940s, primarily for the protection, enhancement, and maintenance of desert bighorn sheep. Desert bighorn sheep habitat on Cabeza Prieta NWR remains essentially intact and bighorn continue to occupy virtually all the species' historic habitat on the refuge. It is likely, however, that present day numbers and densities are much reduced from the "natural" state that prevailed prior to the arrival of European man. The causes behind the general decline of this species on the refuge are as complex as they are varied, and only partially understood.

3.5.3.3.3.1 Pre-European Contact

Desert bighorn sheep were heavily hunted by Native Americans throughout the west as evidenced by vast numbers of petroglyphs and pictographs of bighorn and bighorn hunting (Grant 1980). Although there are few rock art sites depicting bighorn on the refuge, large piles of horns, the remains of earlier hunts, have been found near Cabeza Prieta and Heart Tanks (Fontana 1965, Grant 1980, Cabeza Prieta Annual Narrative Files). Eight desert bighorn sheep horns found at Cabeza Prieta Camp in 1992 were radio-carbon dated to 1860 (+50 years) or roughly the time of the Lincoln administration (David Siegel, USFWS pers. comm. 2003). Prehistoric hunters, wielding only primitive weapons, were known to be incredibly

effective harvesters of wild game. In some areas, this caused locally depleted game populations, particularly in the vicinity of permanent settlements. Much of the Sonoran Desert has been occupied by humans for over 12,000 years (Sheridan 2000). Although archaeological sites on the refuge have only been dated as far back as 1000-1500 A.D., human use of the area likely was prevalent prior to 200 A.D. (SWCA, Inc. 2001). Critical resources were likely too scattered and ephemeral on the refuge to support anything except seasonal settlements (SWCA, Inc. 2001). No reliable data exist on numbers of bighorn sheep in the region pre-European contact or what effects prehistoric inhabitants of the area may have had on desert bighorn sheep populations. The period immediately prior to the arrival of European man, modern firearms, domestic livestock, exotic diseases (circa 1540), and a plethora of other human caused influences (other than hunting) approximates "natural" conditions. Given the lack of long-term permanent settlements in the area, passing references by early Spanish explorers of "many wild sheep," (Russo 1956), and until better data exists to suggest otherwise, it is assumed that desert bighorn sheep during this period were likely more abundant and occurred in higher densities across the refuge than currently.

3.5.3.3.3.2 Hunting

Over hunting (subsistence, market, sport, illegal) is often cited as a primary cause in the decline of big game populations in North America. Spanish explorers, missionaries, and settlers first brought firearms and gunpowder to the southwestern U.S. and northern Sonora, Mexico in the mid-1500s to late 1600s. These weapons, while crude and inefficient by today's standards, allowed game to be harvested more effectively and at much greater distances. They also heralded the rapid advancement of increasingly effective weaponry culminating in the development of "modern" weapons (e.g., repeating rifles firing cartridge ammunition) by the mid-1800s. Mearns (1907) attributed the scarcity of desert bighorn sheep on the Tohono O'odham Indian Reservation, just east of the refuge, to over hunting by Indians with modern firearms, although Audubon (1906) had already described the region as devoid of game by 1849. Settlers, miners, and market hunters are often held responsible for low desert bighorn numbers after the 1880s (Brown 1993). Mearns (1907) also stated that white settlers along the Mexican border believed that desert bighorn sheep in the area were doomed to extinction. The first annual report for the Cabeza Prieta Game Range (CPNWR files), following its establishment in 1939, noted that there was a lot of illegal hunting for bighorn sheep taking place on the Game Range, and that law enforcement would be one of the major problems for the Game Range in its early years.

3.5.3.3.3.3 Domestic Livestock

More important perhaps than the introduction of firearms, early Spanish explorers, missionaries, and settlers also brought domestic livestock into the Sonoran Desert. Cattle and other domestic livestock were first introduced to northwestern Sonora, Mexico by Father Kino in 1694. In 1702, Father Kino estimated that a ranch near Sonoyta, Mexico (just southeast of the present day refuge) had more than 3,500 head of cattle (Officer 1993). Overgrazing well into the nineteenth century caused widespread habitat changes throughout much of the Sonoran Desert. Interestingly enough, overgrazing may not have been as severe across southern Arizona in the 1800s because of hostilities with Apache Indians (Sheridan 2000). By the early 1900s, American ranchers were firmly established and raising livestock in much of the area that would become Cabeza Prieta National Wildlife Refuge. Because the International Boundary fence wasn't built until 1947, livestock from the U.S. and Mexico ranged freely across the border. Accurate estimates of livestock numbers on the refuge in the early years of the 20th Century are sparse, but in 1942 on the adjacent OPCNM, there were an estimated 1,000 head of burros and horses on the southern half of the monument, and another 3,000 cattle on the entire monument (Susan Rutman OCPNM, pers. comm. 2003). Livestock grazing was completely removed from the refuge in 1983. Cattle grazing continues to this day, however, on BLM lands just east of the refuge. In addition, the border fence with Mexico is missing, washed out, and/or cut in many places and trespass livestock regularly moves onto the refuge. Brown (1993) states that the "...coincidental evidence linking the reduction and elimination of bighorn sheep populations with the arrival of man's livestock is overwhelming." Livestock compete directly with desert bighorn sheep for available forage and water. This can be especially critical during periods of extended drought with little

or no green forage production. Continued overgrazing such as occurred during the early part of the 1900s, can also lead to changes in vegetation communities, favoring tree species such as mesquite and paloverde in the bajadas and foothills, and unpalatable shrubs such as creosotebush in the intermountain valleys. Given their preference for wide open vistas, increased vegetation density in these areas likely limits use by desert bighorn sheep and may hamper cross-country movements between mountain ranges.

3.5.3.3.3.4 Livestock-borne Disease

Brown (1993) considered diseased introduced by domestic livestock, especially sheep and goats, to be the greatest single factor in the decline and/or extirpation of many desert bighorn sheep populations in Arizona. These diseases are not natural to desert bighorn sheep, and bighorn sheep in general may be one of the most sensitive North American wild ungulates to common livestock diseases and parasites (Jessup 1985). Some of the major diseases found in desert bighorn sheep include scabies, chronic sinusitis, leptospirosis, contagious eczema, EHD, bluetongue, and pneumonia (deVos 1993). The severe impacts that various diseases, acting alone or synergistically, can have on desert bighorn sheep populations in the southwest have been documented on several occasions.

Desert bighorn sheep in Ironwood National Forest, Arizona suffering from a bacterial infection that has led to blindness. The infection is believed to have spread from domestic goats released into the forest

Photo courtesy of Brian Jansen, AGFD

Desert bighorn sheep in the San Andres Mountains (a large portion of these mountains is located within the San Andres National Wildlife Refuge) numbered about 200 until psoroptic scabies swept through the herd and left fewer than 75 animals in a one-year period (Sandoval 1980). By 1997, only one adult ewe remained in the San Andres Mountains (Rominger 1998).

In 1980, all 32 desert bighorn sheep in an enclosure on Lava Beds National Monument, California, died of Pasteurella pneumonia over a period of 25 days in July (Blaisdell 1982). Although never conclusively proven, the only other outside variable noted (since the previous February when the animals were severely harassed during a capture operation within the enclosure) was the presence of domestic sheep adjacent to the enclosure on several occasions. The bighorn sheep all appeared healthy prior to contact with domestic sheep.

Chronic sinusitis is a disease that causes necrosis of desert bighorn sheep skulls. The causative agent for chronic sinusitis is uncertain although it is thought to be the sheep bot fly larva (*Oestrus ovis)* with secondary infections from corynebacteria (Bunch *et al.* 1978). The disease may take several years to develop in an individual, and is thought to be terminal (Bunch *et al.* 1978). Symptoms of the disease include progressive debilitation (upwards of 50 percent weight loss), draining lesions on the forehead, broken horns, and eventual blindness. Chronic sinusitis received increased attention when 41 percent of desert bighorn sheep one year old or less in a captive herd in southwest Utah were diagnosed with the disease (Bunch *et al.* 1978). Although the disease is thought to be widespread in desert bighorn sheep populations across Arizona, until recently it had not been documented on Cabeza Prieta NWR (Bunch and Webb 1979, Scott *et al.* 1990). Recent information has shown the disease may be much more prevalent on the refuge than previously

thought and could have serious consequences for the refuge population. During a refuge-wide bighorn sheep survey in October 2002, several rams and ewes were observed with horns broken off near the base. (Morgart 2002). In addition, 7 of 11 (64 percent) pick-up skulls and mortalities over the course of the last 2 years show signs of possible chronic sinusitis infection (Cain, University of Arizona, unpublished manuscript). These skulls are in the process of being independently evaluated by an expert in this disease.

On a positive note, and with the possible exception of chronic sinusitis, desert bighorn sheep on the refuge have been found to be free of many of the common diseases found in other bighorn sheep populations across the State. In 1986, of seven bighorn sheep tested from the refuge and adjacent BMGR, only one ewe tested positive to exposure to any virus (contagious eczema) known to be a pathogen in bighorn sheep. The same animal was seropositive to leptospirosis, a contagious bacterial disease. Two ewes tested positive to respiratory syncytial virus using one test for this disease, but negative using a second test. All seven sheep tested negative for infectious bovine rhinotracheitis, parainfluenza-III, bluetongue, and epizootic hemorrhagic disease. Similar results were found in more recent (2001-2002) tests of desert bighorn sheep on the refuge (Cain, University of Arizona, unpublished manuscript 2003). These results were particularly interesting in light of the high exposure rate to bluetongue documented for Sonoran pronghorn in the area (J. Hervert, AGFD pers. comm. 2003).

Nutritionally stressed animals may be pre-disposed to disease through lowered resistance (Hailey *et al.* 1972). This may be exacerbated during prolonged periods of extreme heat and drought-related water stress, and when subjected to other human-induced stressors (e.g., excessive harassment at water holes).

3.5.3.3.3.5 Predation

Mountain lions, coyotes, bobcats, and golden eagles are all known to prey on desert bighorn sheep (Kelly 1980a). Of these four, only the mountain lion is known to prey on desert bighorn sheep on Cabeza Prieta NWR with any frequency. There are few records of mountain lions on the refuge, but they do occur at low densities across the refuge on a gradient with highest densities in the east and lowest in the west. Bighorn sheep hunters infrequently report seeing mountain lions in the Growler Mountains during the December hunt (Morgart 2003). At least three bighorn in the Tinajas Altas, Sierra Pinta, and Cabeza Prieta mountains were known to be taken by a mountain lion over the course of several months in 2002 (Cain, University of Arizona, unpublished manuscript 2003; J. Hervert, AGFD pers. comm. 2003). Finally, a mountain lion was seen in the vicinity of bighorn sheep near Heart Tank in the Sierra Pintas during the course of a bighorn sheep survey in October 2002 (Morgart 2003). Given the wide-ranging nature of mountain lions, and the general absence of their primary prey source, mule deer, it was speculated by Service and AGFD biologists on this survey that this was the same lion responsible for taking bighorn in the Tinajas Altas, Sierra Pinta, and Cabeza Prieta mountains. In mountain ranges with healthy populations of bighorn sheep, occasional lion predation is not thought to be an issue. However, in mountain ranges with depressed bighorn numbers, the effects of lion predation could be significant.

Mountain lion at natural tinaja

USFWS Photo

3.5.3.3.3.6 Habitat Loss and Fragmentation

The desert bighorn is a true wilderness species (Leopold 1933) that needs large, rugged expanses of mountainous terrain with wide open vistas in order to thrive. This includes reasonable interspersion of, and access to, important habitat features necessary for survival such as escape cover, thermal cover, lambing areas, movement corridors, nutritious forage, and dependable sources of water. In addition, desert bighorn generally have a low tolerance for excessive human activity, especially during critical times of the year such as lambing or periods of drought-related stress.

Undocumented Aliens at North Pinta Tank, photograph taken by automated camera

USFWS Photo

Habitat loss can be direct and/or indirect. For example, thousands of acres of critical bighorn habitat in the bajadas and foothills of desert mountain ranges adjacent to metropolitan areas have been lost to urban sprawl (e.g., Pusch Ridge Wilderness Area, Tucson, Arizona; Santa Rosa Mountains, Palm Springs, California). More insidious in this instance, however, is the concomitant increase in human activity (e.g., a many-fold expansion in recreational day-hiking), which can displace bighorn from an even wider area of otherwise suitable habitat. The combination of direct and indirect impacts from development and recreation eventually led to the extirpation of desert bighorn sheep in the Pusch Ridge Wilderness Area. The Cabeza Prieta NWR and surrounding lands are fortunate inasmuch as they are generally protected by federal ownership, law, and/or withdrawal status from the threat of most development. Unfortunately, the relatively recent and growing problem of illegal foot and vehicle traffic (e.g., UDAs, drug smugglers) crossing the border from Mexico, and traversing the refuge is having an unspecified impact on all wildlife. Extensive interactions between UDAs, other illegal trespassers, and bighorn likely occur along passes through the mountains and at water developments. Passes are natural features used by illegal travelers for navigation, provide travel corridors through mountain ranges, and are used to avoid detection by law enforcement. UDAs sometimes shelter and rest at water developments during the heat of the day, preventing wildlife use of the waters and depleting water reserves meant for wildlife.

Habitat fragmentation occurs when natural dispersal routes within or between mountain ranges containing metapopulations of bighorn sheep are interrupted by linear developments (e.g., roads, railroads, fences, canals, powerlines) and/or when isolated desert ranges are surrounded by development or agriculture. Although the refuge, BMGR, OPCNM, and adjacent BLM land represent approximately 3 million acres of reasonably continuous habitat, bighorn sheep in this region have been impacted by habitat fragmentation. Specifically, U.S. Highway 85 and Mexico Highway 2 have impacted bighorn sheep movements to the east and south of the refuge, respectively. U.S. Interstate 8, a railroad, and a canal have undoubtedly influenced bighorn movements north of the BMGR. Finally, accidents can account for a significant loss of wildlife. Bighorn sheep and other ungulate species can become entangled in fences, drown in canals, or get struck by trains. As recently as 24 August 2002, an adult male desert bighorn sheep was struck and killed by a vehicle on Highway 85, just north of Ajo, in the Crater Range.

3.5.3.3.3.7 Long-Term Climate Change

Some current analyses of climate in the southwestern U.S. show an overall trend of increasing temperatures, increasing and higher intensity rainfall, and shorter duration of snow pack cover. The causes for climate change are both natural and human-induced, particularly since the advent of the industrial age. The current climate is an interglacial period, the driest and warmest period to occur during the last 32,000

years. Over the last century, average temperatures in the southwest have increased by 1-2 degrees Celsius (2-3 degrees Fahrenheit). Temperatures during the late 1990s approached the record-breaking temperatures that occurred in the 1890s. Even more rapid warming is occurring in northern Sonora, Mexico. The 1990s have been one of the warmest decades on record across the globe, potentially the warmest since the 1400s. Precipitation has also moderately increased over the last century, but less so in the Southwest than other parts of the U.S., and southern Arizona appears to be experiencing declines. Greater frequency of summer drought will likely increase the rate of shrub invasion in the southwest, and some attribute the ongoing expansion of creosote in southern Arizona to recent climate change. Periods of drought and "wet" years appear to be cyclical. It is unquestionable that the refuge and surrounding area are in a long cycle of relative drought. This drying trend for the region will likely have significant ramifications on the amount and duration of water that is captured and stored in current natural catchments and developed waters, and the composition and availability of preferred forage for desert bighorn sheep. Climate trends, coupled with a plethora of human-induced factors such as livestock-introduced diseases, livestock grazing changes in vegetation composition, habitat fragmentation, and a burgeoning problem with illegal across the border activities result in increasing challenges for managers attempting to maintain a semblance of "natural," healthy populations of desert bighorn sheep on the refuge.

3.5.3.3.4 Management Strategies

Past and present desert bighorn sheep management strategies on the refuge include law enforcement to control poaching, protection of habitat from disturbance, removal of trespass livestock, predator control, water developments, and a closely monitored hunting program. Establishment of the Cabeza Prieta National Wildlife Refuge (and its sister refuge, Kofa NWR) in 1939 was prompted by the Arizona Game Protective Association (the predecessor of today's Arizona Wildlife Federation), the Boy Scouts of America, and a number of individuals, to save the desert bighorn sheep from the threat of extinction. At the time of establishment, there were extensive reports of illegal hunting both on the refuge and surrounding areas and one of the first priorities was to establish a law enforcement program to address this issue. Today, there is virtually no illegal hunting of desert bighorn sheep on the refuge or adjacent federal lands, and most law enforcement efforts are now focused on stemming the flood of UDAs and drug traffic. Habitat is afforded protection by virtue of wildlife refuge designation, wilderness designation of much of the refuge, and restrictions managing human use of the refuge. Current regulations are likely adequate to control legal use of the refuge within acceptable levels in terms of impacts to refuge resources. The same claim, unfortunately, cannot be made for illegal, cross border activities.

Grazing was once widespread across the refuge, prior to its establishment as a Game Range in 1939. Most livestock grazing on the refuge was halted in 1941 as a result of the refuge's inclusion as part of the bombing and gunnery range. The refuge shares a 90-kilometer (56-mile) border with Mexico. Prior to 1947 and the construction of the International Boundary Fence, livestock from the U.S. and Mexico ranged freely across the border. This fence was never completed on the far western end of the refuge and trespass livestock from Mexico periodically move on to the refuge to this day in this area. Various cattle operations continued to run trespass livestock in the center and western ends of the refuge into the mid 1950s, but by 1957 most illegal livestock had been removed. The Cameron Allotment on the east side of the refuge was the only entity legally running livestock. In 1983, the last of the grazing rights on the refuge were extinguished and cattle were removed from CPNWR. Today, the refuge shares a boundary with two BLM livestock allotments on its eastern edge. The livestock fence delineating this boundary is frequently cut by UDAs and occasionally washes out. Although cattle trespass on the refuge occasionally occurs, it is not considered to be a significant issue for desert bighorn sheep today. For reasons stated under the disease section, of more immediate concern is the periodic occurrence of feral goats moving onto the refuge into bighorn sheep habitat.

A dedicated predator control program was sporadically applied on the refuge in the past. In the mid-1940s the first trapper was hired with refuge funds to trap coyote and bobcat. Some use of poison was employed in 1946-47 for coyotes on the refuge. In the 1950s, both poisons and firearms were used for predator

control. Finally in 1963, the Branch of Predator and Rodent Control began a predator control program on the refuge, and primarily employed coyote getters, baits that inject poison into the mouths of animals attempting to eat them. In recent years, no predator control has been conducted. The level of predator control as described in refuge narratives and other reports likely had little influence on the refuge desert bighorn sheep population.

The primary bighorn sheep management strategy on the refuge has been a program of enhancing existing, and developing new, waters. Most of this work took place between 1948 and 1960, other than placement of a parabolic tank for bighorn sheep on Child's Mountain in the late 1980s. There is some controversy regarding the benefit that developed water provides desert bighorn sheep in natural environments. Rosenstock *et al.* concluded that water developments have benefited some, but not all, populations of desert bighorn sheep in the southwest (1999). Other researchers, however, have questioned the ultimate effect of developed waters on desert bighorn sheep and other desert wildlife, pointing out that unambiguous research into this topic is lacking, and that developed waters may introduce pathogens and support predators of ,and competitors to, desert bighorn sheep populations (Broyles 1995, Krausman 2004). In a 1999 study, Broyles and Cutler found no difference in relative sheep abundance, lamb/ewe ration, yearling/ewe ratios or ram/ewe ratios in sheep populations in mountain with and without perennial sources of water. In a rebuttal review of this study, however, Rosenstock *et al.*, determined that Broyles and Cutler's characterization of mountain ranges on the refuge has having perennial water during the study period had been incorrect (2001). All of this serves to illustrate the controversy that exists regarding the relationship of desert bighorn sheep populations and developed wildlife waters.

Virtually all waters placed for bighorn sheep on the refuge are heavily used by bighorn, particularly during the hottest months of the year, and during periods of prolonged drought when preferred forage has dried up or is unavailable. Quantifiable estimates of how water developments have influenced bighorn populations on the refuge are not currently available. Subjective evaluations by professional wildlife managers strongly suggest that these waters are important for the health of bighorn populations. In the best biological opinion of knowledgeable wildlife professionals, desert bighorn sheep have habituated to water developments on the Cabeza Prieta National Wildlife Refuge over the course of the last 50 years. The refuge has cooperated with the University of Arizona on an investigation of use and dependence on developed waters by bighorn sheep.

In 1968, the refuge was opened to hunting for desert bighorn sheep. The hunt occurs during the month of December, and the number of permits allocated each year are carefully controlled through a cooperative management program between the AGFD and the refuge. The number of permits issued annually is based upon the results of the refuge-wide population survey conducted every three years. This is a very conservative hunt and permit numbers for rams have fluctuated from one to seven over the years. Desert bighorn sheep are considered to be a premier trophy animal, a once in a lifetime opportunity in Arizona, and hunters focus on taking only the largest-horned animals. In most cases, these are animals past their prime in terms of breeding potential, and animals removed by sport hunters have virtually no impact on the overall health of the population.

3.5.4 Birds

Bird species richness is relatively low in the Lower Colorado River Valley subdivision, as compared with wetter areas in Arizona, and only slightly higher in the Arizona Upland division. Typical bird species found in the Lower Colorado River Valley subdivision include: LeConte's thrasher, black-throated sparrow, verdin, loggerhead shrike, lesser nighthawk, and black-tailed gnatcatcher. Common spring and fall migrants include western wood peewee, Nashville warbler, MacGillivray's warbler, yellow warbler, Wilson's warbler, and black-headed grosbeak. Common birds wintering in this division include Cooper's hawk, ruby-crowned kinglet, Brewers sparrow, vesper sparrow, white-crowned sparrow, and sage sparrow. Typical species for the Arizona Upland subdivision include: Harris hawk, white-winged dove, greater roadrunner, mourning dove, verdin, cactus wren, black-tailed gnatcatcher, phainopepla, Gambel's quail, Costa's hummingbird, gilded flicker, and Gila woodpecker. All of these species can be found on the refuge, where

there are presently more than 212 species of birds recorded, with 41 of them known to nest there. A complete species list is found in Appendix H.

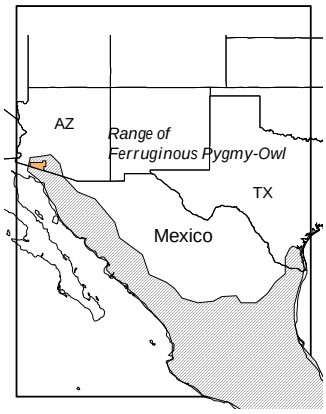
Threats to nesting birds in the Sonoran Desert include urbanization, fire, grazing, and burro browsing. The refuge is not threatened by growing urbanization, which represents the major impact to nesting birds in the Sonoran Desert, and serves as important refugia for birds sensitive to urbanization, such as cavity nesters, insectivores, ground nesting species, and species that feed in low shrubs. Black-throated sparrows and black-tailed gnatcatchers are associated with undisturbed native vegetation, and do not occur even in low-density housing developments. Other species sensitive to urbanization identified by the Arizona Partners in Flight Bird Conservation Plan include cactus ferruginous pygmy-owl, northern flicker, pyrrhuloxia, verdin, Gambel's quail, ash-throated flycatcher, greater roadrunner, rufous-winged sparrow, and ladder-backed woodpecker.

Phainopepla

drawing by Bonnie Swarbrick

3.5.4.1 Species of Conservation Concern

3.5.4.1.1 Cactus Ferruginous Pygmy-Owl *(Glaucidium brasilianum cactorum)*



The cactus ferruginous pygmy-owl, listed as Endangered in 1997 and delisted in 2006, is a small (18 centimeter [7 inch]) diurnal owl reddish brown overall with a cream colored belly streaked with reddish brown. Its barred tail has dark and brown bars which distinguishes it from a northern pygmy-owl which has light and brown bars. Its lack of "ear" tufts and smaller size distinguishes it from screech-owls, and its black and white eye spots on the back of the head distinguish it from other small earless owls such as elf owls. They are best located by their repetitive "toot" during the day.

3.5.4.1.1.1 Distribution

drawing by Bonnie Swarbrick

The cactus ferruginous pygmy-owl occurs from lowland central Arizona south through western Mexico to the states of Colima and Michoacan, and from southern Texas south through Tamaulipas and Nuevo Leon. South of these regions and into Central America it is replaced by Ridgway's pygmy-owl. In Arizona, its range is limited to Sonoran desert scrub and riparian habitats below 1,220 meters (4,000 feet) MSL. Although its numbers appear to be stable in Mexico, this species has suffered declines in Arizona due to loss of riparian habitat and urban development. Until a few years ago, less than a dozen locations were known, all surrounding Tucson.

Pygmy-owls are now considered non-migratory throughout their range after their resident status was documented in the state. They nest in tree and cactus cavities in mature cottonwoods, mesquite bosques, and Sonoran desert scrub in Arizona, oak and bald cypress in Mexico, oak and mesquite in south Texas. The earliest nesting record is April 12th

and the latest is estimated to occur the last week of May or first week in June. Juveniles remain close to adults until dispersal when they may disperse as much as 6.4 kilometers (4 miles) in Texas and 3.2 kilometers (2 miles) in Arizona before establishing their own territories.

3.5.4.1.1.2 Habitat Requirements

The cactus ferruginous pygmy-owl in Arizona is primarily associated with Arizona Upland subdivision below 1,220 meters (4,000 feet) MSL with both species and structural diversity, well-developed ground cover, mid-story, and canopy layers required to provide adequate prey base. In riparian areas, plant species may include cottonwood, willow, hackberry, and mesquite. Within desert scrub, plant species include saguaro, mesquite, paloverde and ironwood. It was historically considered a riparian species. Cactus ferruginous pygmy-owls in Tucson and OPCNM occur proximate to low-density developments adjacent to large undeveloped tracks of desert scrub.

The Arizona Partners in Flight Bird Conservation Plan identifies the following objectives:
- Maintain and increase current population in suitable habitat
- Protect known breeding locations from disturbance

and recommends comprehensive surveys throughout Arizona Uplands and riparian habitat.

Only two records exist for the refuge (Monson 1998, Cabeza Prieta Mountains; Flesch, Agua Dulce Mountains). Recent surveys on the eastern portion of the refuge did not detect any birds. A researcher from Cornell, recording bird songs by balloon, reported a suspected pygmy-owl heard while setting up his equipment. This report occurred in the general area where pygmy-owls were recently observed. A nesting pair is known from OPCNM and more are suspected on Tohono O'odham lands.

Other species associated with the pygmy-owl and that may use similar habitat and benefit by management for the owl, include: Harris' hawk, Gila woodpecker, gilded flicker, Gambel's quail, curve-billed thrasher, black-tailed gnatcatcher, phainopepla, cactus wren, verdin, elf owl, pyrrhuloxia, ash-throated flycatcher, Albert's towhee, hooded oriole, and Scott's oriole.

3.5.4.1.2 Loggerhead Shrike (*Lanius ludovicianus*)

The loggerhead shrike bears a close resemblance in size and coloration to the mockingbird, but can be differentiated by its larger head, black mask, hooked bill, and slightly different wing patch. Nicknamed "butcher birds", they impale small prey on thorns. Numbers are seriously declining in the eastern U.S. and prairie regions of U.S. and Canada. Primary cause for decline is degradation of habitat due to conversion of farm pasture in the east, and loss of native grasslands in the west in both summer breeding and wintering habitats. Primarily grassland birds, loggerhead shrikes are listed as a Migratory Nongame Bird of Management Concern by the USFWS. Conservation measures call for protection of native grasslands, controlling grazing and mowing, and maintaining brush along fence lines. Loggerhead shrike habitat is composed of grassy areas with scattered trees and shrubs.

Loggerhead shrike were identified as confirmed breeders on six blocks and possible breeders on two blocks of the Arizona Breeding Bird Atlas located on the refuge and surveyed from 1994-1997. Loggerhead shrikes have been detected on the Cabeza Prieta Breeding Bird Survey Route, which traverses the northeastern portion of the refuge, (USFWS national survey) only two out of five years. Christmas Bird Counts conducted on the refuge 23 years since 1955 have located shrikes all but one year. Numbers have ranged from one to 35 birds but because of the variability in level of expertise in volunteer counters, no conclusions can be drawn from these Christmas Bird Counts.

3.5.4.1.3 Le Conte's Thrasher *(Toxostoma lecontei)*

The Le Conte's thrasher is a pale gray bird approximately 28 centimeters (11 inches) long. It prefers sparsely vegetated habitats. The Le Conte's thrasher's breeding range currently extends from Southern Nevada and Southwestern Utah to Southeastern California and Western/Southwestern Arizona, northeastern Baja and northwestern Sonora. Uncommon and local throughout its range, the LeConte's is not known to be migratory.

Nesting occurs from February to June with two or three clutches raised in nests built of twigs and lined with three layers of flowers, leaves and fibers. Nests are usually constructed in dense thorny vegetation such as wolfberries, mesquite, paloverde, creosote, or cholla cactus.

The Le Conte's inhabits the lower valleys vegetated with creosote, dunes, and sandy washes within the Lower Colorado River Valley Subdivision, and is the only avian species diagnostic of this habitat type. Nesting tends to occur in thorny vegetation associated with solitary trees or small stands of trees. Le Conte's thrasher is a cursorial bird (i.e., adapted to running), foraging almost entirely on the desert floor, primarily under desert shrubs. The decline of its breeding range is mainly attributed to habitat degradation (destruction of litter and shrubs).

Management recommendations by the Arizona Partners in Flight Bird Conservation Plan include:

Human Disturbance
- Protect known at-risk breeding territories
- Avoid RV use on BLM lands during breeding season

Loss of Habitat
- Protect large tracts of optimal Le Conte's thrasher desert habitat

Research
- Determine whether birds will respond to rehabilitated farmland
- Conduct surveys in high-use areas with good thrasher habitat
- Evaluate use of artificial nest trees
- Determine factors limiting distribution
- Study population and range trends

The refuge contributes to conservation of Le Conte's thrasher by protecting habitat, and conducts annual surveys of the Cabeza Prieta Breeding Bird Survey Route that contribute to the knowledge about this species. Le Conte's have not been detected on the refuge during the annual Christmas Bird Count. Refuge participation in the Arizona Breeding Bird Survey resulted in confirmed breeding in the survey blocks located on Childs Mountain, Christmas Pass, Paradise Canyon, and Monreal Well, and two instances of probable/possible breeding in the Tule Mountain block. In addition, breeding surveys have been conducted throughout suitable habitat within the refuge. A long-term monitoring program examining breeding success and habitat use was initiated during the winter of 2002.

3.5.5 Reptiles and Amphibians

During the warmer portions of the year, refuge daytime high temperatures can exceed 38 degrees Celsius (100 degrees Fahrenheit) for 90 to 100 consecutive days and precipitation rates are variable, but generally low. This hot and arid climate of the Sonoran Desert provides excellent habitat for reptiles, but generally limits the diversity of amphibians. The refuge provides habitat for 17 lizard species, 20 snake species, and 4 species of toads. Species such as Couch's spadefoot toad, desert iguana, long-nosed leopard lizard, desert horned lizard, coachwip, and western diamondback rattlesnake are found in the Lower Colorado River Valley Subdivision. Red-spotted toad, desert tortoise, chuckwalla, collared lizard, Gila monster, rosy boa,

and black-tailed rattlesnake are typically found in the Arizona Upland Subdivision. Amphibian activity usually occurs during the summer monsoon period, while snakes are most active during the warmer portions of the year. Many refuge lizard species exhibit the same activity period of the snakes, although a few lizard species are active during any warm period.

3.5.5.1 Species of Conservation Concern

3.5.5.1.1 Arizona Chuckwalla (*Sauromalus obesus*)

Chuckwallas are large, broad lizards with loose folds of skin on their neck and sides. Chuckwallas can reach 14 to 20 Centimeters (5.5 to 8 inches) from the head to the base of tail, and 41 centimeters (16 inches) in length from the head to the tip of the tail. These lizards inhabit rocky areas including lava flows, rocky outcrops, and rocky hillsides and hilltops.

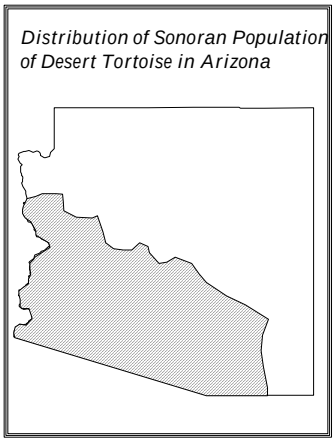
3.5.5.1.1.1 Distribution and Habitat

Chuckwallas are found in almost all rocky areas within the refuge. Chuckwallas inhabit the southwestern deserts in the United States and Mexico. Active periods for chuckwallas coincide with the warmer portions of the year. Chuckwallas remain active in temperatures exceeding 39 degrees Celsius (102 degrees Fahrenheit). When disturbed, chuckwallas find shelter in rock crevices, where they gulp air to wedge themselves as a defense against predators.

3.5.5.1.1.2 Food Requirements

Chuckwallas are almost exclusively herbivores, consuming primarily desert annuals, a few perennials, and occasionally insects. When food resources are abundant, territorial behavior may occur with dominance hierarchy based on size. Territoriality tends to not occur during periods when food resources are scarce, however some males may defend remaining food plants.

3.5.5.1.2 Desert Tortoise (*Gopherus agassizii*)



The desert tortoise has a high-domed shell with prominent growth lines forming concentric circles on the carapace (upper side of shell). The lower shell, or plastron, has a pronounced protrusion under the head used to flip other tortoises over. Adult shell length ranges from 17.5 to over 30 centimeters (7-12 inches). The legs are covered with large scales, giving them a hobnail appearance.

3.5.5.1.2.1 Distribution and Habitat

Desert tortoise is separated into two populations. The Mojave, generally found north of the Colorado river in Arizona, is an endangered species. The rest of the state's population is considered the Sonoran population, bounded by the San Pedro River on the east, Mojave County on the north, and beyond the international boundary to the south. Density and distribution is lower in southwest Arizona where the refuge is located. Desert tortoises occur mainly on rocky slopes and bajadas of Mojave desert scrub and Arizona Upland and Lower Colorado subdivisions of the Sonoran Desert, most often in paloverde-mixed cacti associations. Boulders, outcrops, and natural cavities with enough deep soil to excavate a shelter are important components of the habitat. In Mexico, desert tortoises are restricted to arroyos, slopes, and bajadas below 800 meters (2,600 feet) MSL. Studies have found various home range sizes.

3.5.5.1.2.2 Food Requirements

Desert Tortoise

FWS Photo

Desert tortoise are primarily herbivores that consume fresh annual vegetation, cured annuals, plant litter, and perennials, but also eat arthropods, bones, soil, and feces of other vertebrates. They appear to prefer native plants to exotic plants. One study found tortoises fed mainly on grasses and forbs with seasonal additions of wildflowers in spring and cactus fruit in fall.

3.5.5.1.2.3 Abundance

The Arizona Interagency Desert Tortoise Team monitored ten sites in the Sonoran Desert in the 1990s and found that populations appear to be stable or increasing at nine of the ten sites (1996).

3.5.5.1.2.4 Threats

- Habitat fragmentation
- Habitat loss and degradation from urban and agricultural development
- Wildfires associated with invasion of non-native grasses and forbs
- Illegal collection
- Genetic contamination by escaped or released captive

3.5.5.1.3 Flat-tailed Horned Lizard *(Pyrynosoma mcalli)*

The original historical range of the flat-tailed horned lizard is recognized as extending from the Coachella, Imperial, and Borrego Valleys in Riverside, Imperial, and extreme eastern San Diego Counties, California; west of the Gila and Tinajas Altas Mountains and south of the Gila River, Yuma County, Arizona; northeastern Baja California, east of Sierra de Juarez and north and west of Bahia de San Jorge in Sonora, Mexico. The distribution of this species is now much more restricted. Although the flat-tailed horned lizard has not been documented on the refuge, researchers suspect they may be found on the Pinta Sands area.

3.5.6 Invertebrates

The Sonoran desert is known for several interesting invertebrate species including scorpions, tarantulas and millipedes, but refuge specific information regarding insect and other invertebrate species composition, density and distribution is lacking. Invertebrates play an important role in the Sonoran Desert, for example termites play an essential role in decomposing and recycling nutrients from living and dead plant tissue. Many insect species are important pollinators of wildflowers and cacti. Insects are also an important food base for many of the birds and small mammals inhabiting the refuge.

3.6 PUBLIC USE FACILITIES

Recreational developments on the refuge are limited. Roads are virtually unmaintained and passable only by 4-wheel drive or high clearance vehicles.

Aerial view of El Camino del Diablo

USFWS Photo

Access to the wilderness is provided by a non-wilderness corridor along El Camino del Diablo and the Christmas Pass Road (also called the Tacna Road). El Camino del Diablo is by far the most heavily used road on the refuge. Located near the southern border, El Camino del Diablo follows portions of the historic route of the original El Camino del Diablo and passes Papago and Tule Wells, two developed campsite areas on the refuge (each has picnic tables and charcoal fire grates). El Camino del Diablo is extremely popular among overnight users since it passes near many of the mountain ranges and traverses the northern tip of the Pinacate Lava Flow. Access to this 4WD road is from Ajo on the east and Welton on the west of the refuge. The Christmas Pass Trail joins El Camino del Diablo on the western third of the refuge traveling north passing between the Cabeza Prieta Mountains and the Sierra Pinta Mountains before exiting the refuge at its north boundary.

Approximately 234 kilometers (145 miles) of administrative trails cross portions of the refuge within designated wilderness. Mechanical or motorized transport is prohibited from these trails but a few backpackers are starting to use them.

The only road open to vehicles in the non-wilderness portion of the refuge is the Charlie Bell Road, located in the northeast corner of the refuge south of Childs Mountain. This road extends approximately 19 kilometers (12 miles) west into the Growler Mountains, and is used primarily by day visitors.

3.7 SPECIAL MANAGEMENT AREAS

3.7.1 National Register of Historic Places District

Marker along the historic El Camino del Diablo USFWS Photo

El Camino del Diablo trail district was placed on the National Register of Historic Places in 1978 and is listed by the State Historic Preservation Office as an Arizona historic trail. The National Historic District is a 1.6-kilometer (1-mile) wide corridor centered on the original trail used by travelers in the region since the pre-European contact era. The name El Camino del Diablo - "the Devil's Highway" - first appears in historical records from the 1850s, and was likely coined by prospectors on their way to the California gold fields and other travelers from Caborca, Mexico to Yuma, Arizona. Thousands of prospectors braved this arid route. It has earned its name as the most deadly immigrant trail where over 400 travelers perished over the years.

3.7.2 Cabeza Prieta Wilderness

A view of the Cabeza Prieta Wilderness USFWS Photo

The Cabeza Prieta Wilderness was first proposed as a Wilderness Study Area in 1968 and was designated by the Arizona Desert Wilderness Act of 1990. Special provisions for border law enforcement agencies and the military were included in the act. The wilderness boundary coincides with the lands formerly withdrawn for military use.

At 325,133 hectares (803,418 acres), the Cabeza Prieta Wilderness is the largest NWR wilderness outside of Alaska. Despite its large size, this wilderness is relatively accessible to visitors due to the unique non-wilderness road corridors along El Camino del Diablo and Christmas Pass Road. A network of administrative trails also exists in the wilderness. These are old jeep or truck trails that were established prior to wilderness designation. The administrative trails are used for vehicular access to the refuge by staff for management purposes, subject to minimum requirements analysis, but are closed to any mechanical or motorized travel by the general public.

3.8 OTHER USES

3.8.1 Military Facilities and Artifacts

Volunteers dismantling a tow dart USFWS Photo

Past military use has left a scattering of debris throughout the refuge. These materials range from numerous .50 caliber machine gun shell casings to larger items such tow darts. The darts are wood and aluminum winged structures approximately 4 meters (13 feet) in length that were towed behind aircraft and used as targets in air-to-air gunnery targets. Analysis of aerial photographs conducted by the Air Force in 1998 yielded an estimate of more than 1,600 darts within the refuge.

3.8.2 Childs Mountain Military and FAA Surveillance Operations

The AFS is a radar surveillance station that was constructed between 1956 and 1958. Operations at the AFS were terminated in 1971, the family houses were relocated to Gila Bend, and all other facilities were removed. Remaining in place were the Air Force RCAG Operations Tower, Building 56, a hardened concrete reinforced structure, several towers used by other agencies, and a FAA radar installation that was removed prior to construction of an upgraded facility in 1999.

The FAA's ARSR-4 radar facility constructed in 1999 serves as a civilian aircraft tracking system and as a border surveillance system for the Air Force and CBP-BP. Additional commercial communications sites have been developed within the Childs Mountain site, to make use of the existing towers and advantageous terrain provided.

3.9 CULTURAL RESOURCES

3.9.1 Cultural Resource Inventories

Petroglyph USFWS Photo

Surveys are required when new projects will disturb the soil surface, such as road construction, prescribed fire activities, facilities construction and remodeling, and any other activity that has the potential to affect historic properties.

Less than one percent of the refuge has been inventoried for archeological and historic sites. The few reports and accounts available for the refuge come from a handful of limited surveys that have been conducted (Ezell 1954, Fontana 1965, Rozen 1979), as well as sporadic visits to the area made by southwest scholars since the 1920s. There has been no authorized excavation, and there is but a single verified date of an artifact available for the refuge, a surface collection of a sheep horn core from a site at Cabeza Prieta Tank. Despite the lack of institutional interest in the area over the years and the limitations of independent data available, enough is known about the refuge to broadly characterize the archeological and historic resources present. *The Cultural Resources Overview and Assessment, Cabeza Prieta National Wildlife Refuge* published in 2001 compiles current knowledge of cultural artifacts and use patterns on the refuge. Recent studies on nearby jurisdictions (BMGR, OPCNM) have shed additional light on the site occurrences that typify this region.

Within the refuge, 45 prehistoric and historic sites have been recorded by a statewide survey. In addition, there are numerous site "leads" and site locations that are known but have not been formally recorded.

3.9.2 Prehistoric and Historic Data

Prehistoric sites fall into categories that are limited to the surface and suggest ephemeral use or occupation of locations by widely dispersed, small groups of prehistoric hunter-gatherers. These sites are: low density artifact scatters of lithic material and ceramics, fire-burned rock and hearths, trails, bedrock mortars, rock alignments, stone piles or cairns, stone windbreaks, sleeping circles, shallow rock shelters, and petroglyphs. With only a few exceptions, the prehistoric sites so far recorded on the refuge do not exhibit any evidence of depth, subsurface features, or middens. Of particular interest are the deposits of shell debris on two sites, which point to the prehistoric shell trade route that has been postulated for the Growler Valley, and which was most probably a significant use of the range for centuries.

Ethnographically, the refuge was the homeland of the Hia C-ed O'odham (Sand Papago). The Hia C-ed O'odham were Piman-speaking, hunting/gathering populations who lived west of Ajo throughout historic times. The small, dispersed bands of Hia C-ed O'odham were encountered by Padre Kino, a late Seventeenth Century Jesuit missionary who traveled extensively in the area that became southern Arizona and northern Sonora, and by travelers on El Camino del Diablo for two centuries. While the archeological evidence does not necessarily correspond to historic linguistic groups, it suggests that Hia C-ed O'odham ancestry may extend back more than a thousand of years on the refuge.

Historic sites are primarily early 20th century mining camps and prospecting strikes. El Camino del Diablo is the fabled historic corridor that traversed parts of the refuge landscape between 1540 and the late 1800s. More a braided corridor of travel than a distinct road, it is often incorrectly equated with the modern refuge access road of the same name.

3.10 REGIONAL ECONOMIC SETTING

3.10.1 Surrounding Jurisdictions

Cabeza Prieta NWR is located in Yuma and Pima Counties in southwestern Arizona. The Mexican State of Sonora is located immediately south of the Refuge. Geographically, 60 percent of the refuge lies in southeastern Yuma County while 40 percent lies in western Pima County. The refuge headquarters is located on the northern edge of the town of Ajo, in Pima County.

3.10.1.1 Pima County

Pima County - is situated in the central portion of southern Arizona, bordering Mexico to the south, Maricopa and Pinal Counties to the north, Santa Cruz and Cochise Counties to the east, and Yuma County to the west. Pima County covers 23,786 square kilometers (9,184 square miles), consisting of the Tucson metropolitan center and scattered satellite communities in outlying areas. Most of Pima County's economic and population base is concentrated in eastern Pima County in the greater Tucson area. The San Xavier, Pascua Yaqui, and Tohono O'odham Nation lands together account for 42.1 percent, State lands 14.9 percent, federal public lands 29.2 percent and private lands 13.8 percent of Pima County's land base (Pima County Department of Transportation 2002).

By the 1950s, the rural and small town setting of Pima County had changed. Agriculture, ranching, and mining activities slowed considerably as educational, medical, and defense-funded research and manufacturing in metropolitan Tucson began to develop and expand (Arizona Department of Commerce 2002). Arizona's mild climate and relatively inexpensive cost of living also served to attract people to the area. Land development as a result of the influx of residents further changed and diversified the economic structure of the county.

Smaller rural communities in western Pima County near the refuge, including Ajo and Why, have developed a separate and distinct economic structure from eastern Pima County. Historically, western Pima County was heavily dependent on large-scale mining operations (Ajo 2001). In recent years, however, the economy has been adversely affected by the loss of mining activities in the immediate area, and the collapse of the Gulf of California shrimp industry in Mexico. In an attempt to revive the sluggish economy, recreation and tourism have been increasingly marketed as replacements to lost industries (Ajo 2001).

The town of Ajo is located immediately to the east of the eastern boundary of the refuge with its major access road being Highway 85. Until the mid 1980s Ajo was historically heavily dependent on mining operations for economic stability. In 1984, Phelps Dodge shut down the mine and smelter operation due to a drastic reduction in the value of copper and labor dispute problems (Ajo 2001). In order to replace lost mining employment and revenues, the town has marketed itself to retirees and tourists to capitalize on Ajo's mild winters and proximity to Cabeza Prieta NWR and OPCNM. According to the Ajo Community Comprehensive Plan (2001), many residents feel the key to Ajo's survival lies in converting the town into a retirement community and tourist center.

3.10.1.2 Yuma County

Yuma County is situated in the southwestern corner of Arizona, bordering Mexico to the south, California to the west, La Paz County to the north, and Maricopa and Pima counties to the east. Yuma County covers 14,473 square kilometers (5,522 square miles) of desert land accented by rugged mountains. The valley regions contain an abundance of arable land, irrigated with water from the Colorado River. Yuma County's economy is centered on its hot, dry climate, its location along the Colorado River, and its location midway between the metropolitan areas of southern Arizona and southern California. Agriculture, tourism, military and government are the County's principal industries (Arizona Department of Commerce 2002). Major communities near the Refuge include Yuma and Welton. Federal public lands account for 81.6 percent,

State lands, 7.7 percent, Native American Nation lands 1.2 percent, and private land 10.5 percent of Yuma County's land base.

3.10.1.3 Tohono O'odham Nation

The Nation of the Tohono O'odham consists of four separate reservation lands. The largest, known as the Tohono O'odham reservation, stretches 145 kilometers (90 miles) across Pima County, covering 1,122,342 hectares (2,773,357 acres) and lies immediately to the east of the town of Ajo and the Refuge. Two principal economic activities on the Tohono O'odham Nation lands include employment by Federal, state, and tribal agencies, and cattle ranching and related activities. Growth in tourism, agricultural, retail/tourism, and utilities sectors are expected as tribal development plans are implemented (Arizona Department of Commerce 2002). Proposed development projects will also provide jobs in construction as new housing units, a shopping center, a gaming center, mining and chemical concerns, and several tourism facility projects are planned (Arizona Department of Commerce 2002). A gaming facility was constructed in 1999 for the Gu Vo district located in the western region of the nation's lands.

Ethnographically, the refuge area was the homeland of the Hia C-ed O'odham (Sand Papago). Descendants of this prehistoric people have been working to establish themselves as a District of the Tohono O'odham Nation. Members of the Hia C-ed O'odham consider the refuge lands part of their ancestral lands and have requested formal participation in matters pertaining to land uses that may affect known burial grounds, trails and locations considered sacred.

3.10.1.4 Mexico

The Mexican state of Sonora is located immediately south of the refuge. Northwestern Sonora is sparsely populated, with inhabitants located in small communities or scattered on many cooperative and private farms that cover the state. The northwestern part of Sonora immediately adjacent to OPCNM is included in the Municipio of Plutarco Elias Calles. The Municipio includes the town of Sonoyta approximately 3 kilometers (2 miles) south of Lukeville, near the United States border.

The ease of access between Puerto Penasco and Arizona (via State Route 85) creates a tight symbiotic relationship through the export of shrimp from Mexico to Phoenix and Tucson, and tourism in the Gulf of California resulting from devaluation of the peso in 1980 (Arizona Department of Commerce 2002). In recent years, however, the shrimp industry has collapsed as a result of continuous over harvesting. Tourism businesses have suffered losses as inflation has countered low prices for goods and services that followed the peso's devaluation.

3.10.2 Population

The 2000 Census estimated Pima County's population at 843,746 and Yuma County's population at 160,026 (table 3.5). Sixteen percent of Arizona residents resided in Pima County while three percent resided in Yuma County (US Census Bureau). As shown in table 3.5, both Pima and Yuma County experienced a population increase from 1990 to 2000 of 26.5 percent and 49.7 percent respectively, however, Yuma County experienced a higher increase than the 40 percent population increase for the State of Arizona (US Census Bureau).

Table 3.5: Regional and Local Population Estimates			
Jurisdiction	1990	2000	Percent Change
Arizona	3,665,228	5,130,632	40.0
Pima County	666,880	843,746	26.5
Yuma County	106,895	160,026	49.7
Ajo	2,919	3,705	26.9
Tohono O'odham Reservation	18,730	10,787	-42.4
Welton	1,066	1,829	71.6
Yuma	54,923	77,515	41.1

Source: US Census Bureau and Arizona Department of Economic Security

As shown in table 3.5, of the local communities surrounding the Refuge, Welton experienced the largest population increase of 71.6 percent while the Tohono O'odham Nation experienced the only population decrease of 42.4 percent from 1990 to 2000 (US Census Bureau). Subsequent to the closure of the mining operations in 1984, Ajo's population decreased by 56 percent from 5,189 to 2,919 from 1980 to 1990 (Arizona Department of Security 2001). Between 1990 and 2000, the population increased 26.9 percent as retirees have continued to move to Ajo (US Census Bureau). Since 1986, nearly 900 houses once owned by Phelps Dodge have been sold to new residents, mostly retirees (Arizona Department of Commerce 2002).

Population composition percentages are presented in table 3.6. In spite of the high proportion of non-native and non-Hispanic newcomers, the multicultural flavor of Pima and Yuma County still remains. According to the 2000 Census, 29 percent of Pima County and 50.5 percent of Yuma County's residents are of Hispanic or Latino origin, compared to the state average of 25.3 percent and the national average of 12.5 percent.

Table 3.6: Population Composition for the Year 2000							
State and Counties				Communities near Cabeza Prieta NWR			
	Arizona (percent)	Pima County (percent)	Yuma County (percent)	Ajo (percent)	Tohono O'odham Reservation (percent)	Welton (percent)	City of Yuma (percent)
White	75.5	75.1	68.3	83.0	8.7	70.6	71.7
Black or African American	3.1	3.0	2.2	0.6	0.3	2.1	3.8
American Indian and Alaska Native	5.0	3.2	0.2	9.7	90.8	2.1	2.2
Asian	1.8	2.0	0.1	0.6	0.2	0.5	2.1
Native Hawaiian and Other Pacific Islander	0.1	0.1	0.0	0.2	0.2	0.4	0.3
Persons reporting some other race	11.6	13.3	23.6	10.8	0.9	27.2	23.9
Persons of Hispanic or Latino origin	25.3	29.3	50.5	37.6	7.1	40.7	45.7
White persons not of Hispanic/Latino origin	63.8	61.5	44.3	54.4	92.9	55.3	47.5

Source: US Census Bureau

3.10.3 Employment and Income

Employment status statistics for 2000 are presented in Table 3.7. In 2000, the 4.6 percent unemployment rate in Pima County was very close to the State average of 4.4 percent while the 6.1 percent unemployment rate for Yuma County was considerable higher than the State average (US Census Bureau). The Tohono O'odham Nation's 9.9 percent unemployment rate was more than double the State average in 2000. According to the Arizona Department of Commerce (2002), additional Tohono O'odham Nation jobs are expected to result from new tribal development plans and construction activities on the reservation. Due to the large number of retired residents, 64.4 percent of Ajo's and 66.1 percent of Welton's population were not in the 2000 labor force (table 3.7). In the city of Yuma, the Marine Corps Air Station and US Army Yuma Proving Grounds accounted for 5.4 percent of the 2000 labor force.

Table 3.7: Employment Status in 2000							
State and Counties				Communities near Cabeza Prieta NWR			
	Arizona (percent)	Pima County (percent)	Yuma County (percent)	Ajo (percent)	Tohono O'odham Reservation (percent)	Welton (percent)	Yuma City (percent)
Population in labor force	62.9	61.8	59.1	35.6	41.2	33.9	59.6
Employed	57.6	56	47.3	32.2	31.3	29.5	49.3
Unemployed	4.4	4.6	6.1	3.3	9.9	4.4	4.9
Armed Forces	0.9	1.2	5.7	0.1	0	0	5.4
Not in labor force	37.1	38.2	40.9	64.4	58.8	66.1	40.4

Source: US Census Bureau

Employment occupation trends for 2000 are presented in table 3.8. The 2000 employment occupational structure for Pima County closely matched the overall State occupational structure. In Yuma County, agricultural based employment accounts for a larger percent of employment as compared to Pima County and the State of Arizona (US Census Bureau). According to the Arizona Department of Commerce (2002), agriculture is a major economic factor in Yuma County and at the current rate of growth for Yuma-area agribusiness is expected to soon become a billion dollar industry.

Table 3.8: Regional and Local Employment Occupation for the Year 2000							
State and Counties				Communities near Cabeza Prieta NWR			
	Arizona (%)	Pima County (%)	Yuma County (%)	Ajo (%)	Tohono O'odham Reservation (%)	Welton (%)	Yuma City (%)
Management, professional, and related occupations	32.7	35	26.7	23.9	23.4	20.7	30.2
Service occupations	16.2	17.6	17.7	28.8	25.7	17.5	18.8
Sales and office occupations	28.5	27.1	26.4	25.5	24	26.9	28.7
Farming, fishing, and forestry occupations	0.6	0.2	6.3	0	1.2	9.2	2.5
Construction, extraction, and maintenance occupations	11	10.7	10.7	10	13.7	9	9.8
Production, transportation, and material transport	10.9	9.4	12.2	11.8	12	16.8	10

Source: US Census Bureau

According to the Arizona Department of Commerce (2002), Federal, state, and tribal agencies are the largest employers on the Tohono O'odham Nation, with cattle ranching forming the second most important employment source. The agricultural, retail-tourism, utilities, and construction sectors are expected to grow as tribal plans are implemented (Arizona Department of Commerce 2002).

In 1980, 60 percent of Ajo's population was employed by the Phelps Dodge Corporation (Arizona Department of Commerce, 2002). Following the closure of the mining operations in 1984, employment in Ajo decreased by more than sixty percent from a labor force of 1,902 to 751 workers from 1980 to 1990. To

accommodate the increasing demand in the retirement and tourist industries in Ajo, the services sector has accounted for a majority of the shift in the employment base (Arizona Department of Commerce 2002). In 1999, Ajo's principal employment was in the tourist, service and commercial sectors (Arizona Department of Commerce 2002).

The income and poverty status for 2000 is presented in table 3.9. Per capita income is the mean income computed for every man, woman, and child in a geographic area (US Census Bureau). Individuals are classified as below poverty if their total income was less than the poverty threshold (US Census Bureau). In 2000, the US Census poverty threshold for an individual under 65 years old was set at $8,667 (table 5). In 2000, 46.4 percent of the Tohono O'odham Nation residents were classified as below poverty while the State average was 13.9 percent. In 2000, the Tohono O'odham per capita income was $6,998, the State average was $ 20,275 (table 3.9). According to the US Census estimates, the Tohono O'odham Nation is severely impoverished.

Table 3.9: Regional and Local Income and Poverty Status for the Year 2000

	State and Counties			Communities near Cabeza Prieta NWR			
	Arizona	Pima County	Yuma County	Ajo	Tohono O'odham Reservation	Welton	Yuma City
Per capita income	$20,275	$19,785	$14,802	$14,548	$6,998	$13,644	$16,730
Percent of individuals below poverty level	13.9	14.7	19.2	22.3	46.4	21.3	14.7

Source: US Census Bureau

Yuma County's 2000 per capita income of $14,802 was well below Pima County's per capita income of $19,785 and the State average of $20, 275 (US Census Bureau). In 2000, Ajo's per capita income was $5,237 lower than the per capita income of Pima County (table 3.9). According to the Ajo Community Master Plan (2001), the lack of economic opportunities results in many young adults leaving Ajo after high school and many of those that stay are low skilled workers with little educational opportunities to advance their careers. This steady increase in services employment is generally reflected in lower paying jobs and lower household income.

Yuma County – The western 60 percent or so of refuge lands are located in Yuma County. Yuma County's economy is centered around its hot, dry climate, its location along the Colorado River, and its location midway between the metropolitan areas of southern Arizona and southern California. These natural characteristics have been reflected in an economy heavily dependent on agriculture, ranching, and tourism. Military operations are also considered important to the local economy with the Marine Corps Air Station and Yuma Proving Grounds. Yuma, 290 kilometers (180 miles) west of the refuge headquarters by road, is the only major urban center in the county. Census data report a 2000 county population of 160,026 persons, of which nearly 77,515 lived in the city of Yuma.

The Tohono O'odham Nation, headquartered in Sells, Arizona, reported a 1990 population of 18,730 and a 2000 population of 10,787, a decrease of approximately 42 percent. Between 1989 and 1991 the unemployment rate rose from 30 percent to 66 percent. This increase can be attributed to more accurate data collection and analysis.

Two principal economic activities on Nation lands include employment by Federal, state, and tribal agencies, and cattle ranching and related activities. Growth in tourism, agricultural, retail/tourism, and utilities sectors are expected as tribal development plans are implemented. Proposed development projects will also provide jobs in construction as new housing units, a shopping center, a gaming center, mining and chemical concerns, and several tourism facility projects are planned. A gaming facility was constructed in

1999 for the Gu Vo district located in the western region of the nation's lands.

Mexico -- The Mexican state of Sonora is located immediately south of the refuge. Northwestern Sonora is sparsely populated, with inhabitants located in small communities or scattered on many cooperative and private farms that cover the state. The northwestern part of Sonora immediately adjacent to OPCNM is included in the Municipio of Plutarco Elias Calles. The Municipio includes the town of Sonoyta approximately 3 kilometers (2 miles) south of Lukeville, near the border.

The community of Sonoyta has a reported population of 12,000. Approximately 9,000 inhabitants are located in the urban area, and the remaining population occupies the surrounding agricultural areas. The economic structure of Sonoyta consists of approximately 60 percent commercial and industrial services, 20 percent financial and other services. Tourism is a major component of the economic structure of the community; however, American visitors traveling to and from the Gulf areas contribute to only a part of tourism revenues received by the community. Of at least equal or greater importance than Sonoyta's tourist industry is the town's position along the major Mexican highway between the large population centers in Baja California and interior Mexico.

The ease of access between Puerto Penasco and Arizona (via State Route 85) creates a tight symbiotic relationship through the export of shrimp from Mexico to Phoenix and Tucson, and tourism in the Gulf of California resulting from devaluation of the peso in 1980. In recent years, however, the shrimp industry has collapsed as a result of continuous over harvesting. Tourism businesses have suffered losses as inflation has countered low prices for goods and services that followed the peso's devaluation.

3.10.4 Transportation

Ajo and the refuge headquarters are accessed by State Route 85. State Route 85 originates at Interstate 10, approximately 24 kilometers (15 miles) west of metropolitan Phoenix, Arizona, and terminates approximately 195 kilometers (120 miles) south at the United States/Mexico border. This highway corridor also intersects Interstate 8 at Gila Bend, Arizona, and links with State Route 86 at Why, Arizona. State Route 85 is the only port of entry to Mexico between the Yuma/San Luis and Nogales, Arizona/Nogales, Sonora, a distance of over 325 kilometers (200 miles). From Why, Arizona, to the OPCNM entrance, southbound traffic is classified as 80 percent in-state automobiles, 16 percent out-of-state automobiles, and 7 percent commercial vehicles. Northbound traffic consists of 77 percent in-state automobiles, 14 percent out-of-state automobiles, and 6 percent commercial vehicles. Arizona Department of Transportation traffic counts in 1992 revealed a peak traffic month in March and a low traffic month in August. Peak traffic days, measured in February and August, show Friday to be the busiest day, and Wednesday having the least amount of traffic.

4.0 Environmental Consequences

This section discusses and analyzes the potential environmental consequences of the proposed action, alternative actions and no action alternative. Environmental impacts, or modifications to the environment that are brought about by an outside action, can be beneficial or adverse. Impacts can be described as direct (effects that are caused by the action or occur at the same time and place) or indirect (effects that are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable). Impacts can also be of long- or short-term influence. Some impacts will have irreversible or irretrievable effects on resources. Finally, cumulative impacts are those attributable to a proposed action and reasonably foreseeable related actions in combination. This analysis identifies the predicted impacts of implementing each alternative, whether direct, indirect, long-term or short-term; the cumulative impacts of the alternative and related, reasonably foreseeable actions; and any irreversible or irretrievable commitment of resources that would result.

Where measurable impacts are predicted, their significance is evaluated in consideration of both context and intensity as required by CEQ regulations (40 CFR 1508.27). A significant effect is one that results in a substantial change in environmental component in question and should have a material bearing on the decision making process.

The Service developed the predicted impacts through the use of existing research, contracted analysis and review among the interdisciplinary team. The basis for determining each impact is summarized in the text.

The resources are addressed in the same order as they were presented in Chapter 3. For each resource the potential impacts of implementing each action alternative are contrasted with the impacts of continuing the current management regime (the No Action Alternative).

4.1 PHYSICAL ENVIRONMENT

4.1.1 Climate

None of the management actions currently occurring on the refuge or proposed under any of the management alternatives would be expected to produce measurable direct or indirect, long or short-term effects on the local or regional climate. Annual thermal and greenhouse gas emissions from refuge and visitor vehicles per year are less than that emitted daily by traffic in a small American city and are dispersed over a large area. Similarly the local effects of increased humidity near developed wildlife waters are too small (30 waters over 348,182 hectares (860,010 acres) to measurably effect climate conditions. Paving, large structures or other developments that increase solar reflectivity are not proposed under any alternative.

4.1.2 Air Quality

The significance threshold for air quality impacts is any non-compliance with federal or state air quality standards. Under current management (the no action scenario) air quality on the refuge is generally very good, with the only significant events being occasional violations of the 24-hour suspended particulates standard on days of high winds when blowing dust exceeds the standard. No change is this condition should result from implementing any of the action alternatives. Air emissions generated on the refuge from all sources (law enforcement vehicles, refuge management vehicles, visitor vehicles and cooking fires) represent a very small fraction of total area emissions. As discussed below for soils, increases in soil disturbance, and thus soil particles becoming suspended on days of high winds, would be a small increment of existing disturbance under all action alternatives. The only potential cumulative negative effect would be a local increase in particulates and sulfur dioxide should the Phelps Dodge copper smelter in Ajo be reactivated. This eventuality, however, is unlikely due to the low value of copper and high cost of

reactivating the smelter (Ajo 2001).

Illegal travel across the refuge, and the border law enforcement response to this activity, causes many adverse impacts to refuge resources. DSH is currently proposing to develop a vehicle barrier on or near the International Border on the refuge. This vehicle barrier would supplement a vehicle barrier recently constructed at Organ Pipe NM. The barrier and service road along the border will be funded by the DHS. The final design barrier will allow passage of wildlife and human foot traffic, but exclude vehicles. Approximately 95 percent of the barrier and service road construction would take place within the 60-foot non-refuge and non-wilderness corridor along the border known as the Roosevelt Reservation. The overall effect to the refuge is expected to be positive because the barrier will greatly curtail illegal cross-border/cross-country vehicle traffic and allow border law enforcement operations to reduce their travel in the refuge to apprehend or rescue smugglers and illegal migrants. The barrier would require regular patrols to detect efforts to circumvent the barrier such as placement of vehicle ramps over the barrier. All environmental and NEPA clearances for construction and operation of the vehicle barrier will be obtained by DHS when actual construction is proposed.

If a vehicle barrier is constructed, considerable decreases in the amount of illegal off-road driving should result, yielding a significant reduction in the long-term soil disturbance. With reduced soil disturbance, refuge soils should gradually become stabilized, and the amount of airborne dust generated by winds across the refuge would decrease.

DHS's decision of whether or not construct a vehicle barrier is beyond the scope of this CCP. The presence or absence of a barrier is not linked to any management alternative. Any long-term improvement of air quality resulting from the construction of the vehicle barrier should thus be considered an independent, cumulative (that is, a reasonably foreseeable effect of actions related to management of the refuge) benefit to the environment of the refuge and its surroundings.

4.1.3 Soils

4.1.3.1 Soil Disturbance and Erosion

4.1.3.1.1 Off-Road Vehicle Use

Off road vehicle use, defined as operation of motor vehicles outside of established roadways open to the public on the refuge (El Camino del Diablo, Christmas Pass Road and Charlie Bell Road to eastern limit of refuge wilderness), or driving beyond the limits of administrative trails by Border Law Enforcement agents, creates a great level of new soil disturbance and erosion by destroying plant cover and soil crusts. Both plant cover and soil curst stabilize soil and recover very slowly from disturbance in the refuge's hot, dry climate. Refuge staff reports that vehicle tracks more than 20 years old remain visible on the refuge (V. Harp, USFWS, pers. comm.). Due to the sensitivity of refuge soils and vegetation to disturbance by off-road vehicle use and the long recovery time after such disturbance, any use of motorized vehicles off of the designated refuge roads and administrative trails is considered significant.

Three types of off-road driving occur on the refuge, illegal travel by UDAs and smugglers, illegal travel by refuge visitors, and travel by border law enforcement agents in hot pursuit of suspects or involved in search and rescue. According to refuge staff analysis of unauthorized road development and other changes in the refuge, most off-road driving on the refuge is illegal travel by UDAs and smugglers (C. McCasland, USFWS, pers. comm.). Off-road driving by border law enforcement personnel is limited, by memoranda of agreement (see Appendix B), to cases of hot pursuit of suspects and search and rescue operations. Although exact figures are not obtainable, illegal off-road driving by refuge visitors is not a major problem, given the low overall visitation to the refuge, warnings provided regarding the hazards of leaving the access corridors and the potential for being ticketed for engaging in this prohibited activity.

Alternative 1, No Action Scenario

Refuge staff estimates that off road driving, primarily by UDAs and smugglers, has affected approximately 61,500 hectares (152,000 acres) of refuge lands, or approximately 17.7 percent of the total refuge area. This is clearly a significant effect on the refuge's soil resource, however it is the result of activities beyond the refuge's control. Border law enforcement agencies patrol the refuge, but their ability to interdict all traffic in so large and remote an area will remain limited and illegal traffic can be expected to continue. No measurable change in illegal off-road driving by UDAs and smugglers from that of the no action scenario should result from implementing any action alternative (Alternatives 2-5). In some cases, however, implementing the action alternatives should produce changes from the no action scenario levels of off-road driving by border law enforcement agencies and illegal off-road driving by refuge visitors. As discussed in Section 7.1.2 above, DHS's proposed development of a vehicle barrier would greatly reduce soil disturbance generated by UDAs and smugglers driving off-road. This benefit, however would be independent of any management proposed in the CCP.

Alternative 2

Implementing Alternative 2 should not appreciably change levels of off-road driving by border law enforcement agencies. The level of illegal off-road driving by refuge visitors should be slightly reduced under this alternative as compared to the no action scenario. This is largely due to small reductions in visitation projected. This alternative also includes additional provision of Leave-No-Trace information to refuge visitors. This may decrease illegal off-road driving by refuge visitors to some extent, but no measurable change is anticipated.

Alternative 3

Implementing Alternative 3 could result in a small reduction in levels of off-road driving by border law enforcement agencies, as compared to the no action scenario. Under this alternative the refuge will provide formal refuge orientation and wilderness training to border law enforcement agents prior to their deployment on the refuge. This additional education will stress the importance minimizing off-road driving. The level of illegal off-road driving by refuge visitors should be slightly reduced under this alternative as compared to the no action scenario. This is largely due to small reductions in visitation projected. This alternative also includes additional provision of Leave-No-Trace information to refuge visitors, and mandates visitor viewing of the Carhart Center's Wilderness Awareness video prior to refuge entry. These additional information pieces may decrease illegal off-road driving by refuge visitors to some extent. No measurable change in off-road driving from the levels of the no action scenario is anticipated.

Alternative 4 (Preferred alternative)

Implementing Alternative 4 should not appreciably change the levels of off-road driving by border law enforcement as compared to the no action scenario. The level of illegal off-road driving by refuge visitors is also not expected to change appreciably under this alternative from that of the no action scenario. An additional deer hunt may increase overall visitation somewhat, thus increasing the opportunity for off-road driving. This hunt will not be implemented until the refuge Sonoran pronghorn population has stabilized, however, so any change would not occur until then. Additional vehicle restrictions should compensate by reducing the number of vehicles used on the refuge public access roads that are most capable of off-road driving. No measurable change in off-road driving from the levels of the no action scenario is anticipated.

Alternative 5

Implementing Alternative 5 should not appreciably change the levels of off-road driving by border law enforcement as compared to the no action scenario. The level of off-road driving by refuge visitors would be likely to increase somewhat should this alternative be implemented. New hunts and reductions in visitor

restrictions would increase visitation numbers, thus increasing opportunities for illegal off-road driving. No measurable change in off-road driving, and its effect on soils, from the levels of the no action scenario is anticipated.

4.1.3.1.2 On-Road and On-Trail Vehicle Use

Soil disturbance and erosion can occur from vehicle use on the refuge public access roads and administrative trails, particularly during times of reduced soil stability or aggressive vehicle operation. The refuge limits these impacts by closing public access roads after heavy rains and scheduling management vehicle trips. Border law enforcement vehicle patrols, however, are outside of the control of the refuge. The requirement of four-wheel-drive vehicles on El Camino del Diablo and Christmas Pass Road reduces road damage from wheel spinning in areas of steep terrain. The greatest soil disturbance from on-road and on-trail vehicle occurs when vehicles detour slightly from the existing traveled surface due to poor conditions or to reverse course. Detouring that results in vehicle use outside of non-wilderness travel corridor, in the case of refuge public access roads, or beyond the primary travel surface, in the case of administrative trails, affecting 10 or more hectares (25 acres) of previously undisturbed soil adjacent to a refuge road or administrative trail is considered a significant impact.

Alternative 1, No Action Scenario

Under the no action scenario regular border law enforcement vehicle patrols produce the greatest soil disturbance of any on-road/on-trail use. This is due primarily to the great increase in traffic load on the refuge public access roads and administrative trails these frequent patrols represent. In some areas where the primary road has been degraded by heavy use, detouring has led to widening of the affected area. Recent reinforcement of some unstable portions of El Camino del Diablo and Christmas Pass Road should greatly reduce the necessity of future detouring. Past detouring and use of the area adjacent to the road as a vehicle turnaround has impacted approximately 20 hectares (50 acres), according to refuge personnel (C. McCasland, USFWS, pers. comm.). This is considered to be a significant impact to refuge soil resources. Border law enforcement agency activities are beyond the control of refuge management and are not likely to change in the foreseeable future. They are thus considered long-term, cumulative impacts.

Use of refuge roads and administrative trails by refuge management, and use of refuge roads by refuge visitors is considerably less than that of border law enforcement personnel, and likely contributes little to the impacts of border law enforcement use of the roads.

On-road driving by UDAs and smugglers is believed to have been high in previous years, but recent increased border law enforcement presence has greatly decreased this use (C. McCasland, USFWS, pers. comm.). On-road and on-administrative trail driving by UDAs and smugglers is no longer considered an important source of soil impacts on the refuge.

Alternative 2

Implementing Alternative 2 would decrease soil disturbance caused by refuge management vehicle operation on roads and administrative trails by approximately 50 percent and refuge visitor driving on the refuge public access roads by approximately 10 percent, as compared to the no action scenario. These percentages, and those presented for the other action alternatives are computed based upon projected management travel for water hauling and other management actions and projections of changed visitation. Should this alternative be implemented, a considerable reduction of refuge management vehicle use and a slight reduction in visitation would result.

In the absence of border law enforcement driving, these reductions might have the long-term effect of allowing recovery to some administrative trails, as well as roadside areas. On-road and on-administrative trail driving by border law enforcement, however, would not change from the no action scenario level. As

noted above for the no action scenario, border law enforcement use is the overwhelming cause of soil impacts from driving on refuge roads and administrative trails.

Alternative 3

Implementing Alternative 3 would decrease soil disturbance caused by refuge management vehicle operation on roads and administrative trails by approximately 30 percent and refuge visitor driving on the refuge public access roads by approximately 5 percent, as compared to the no action scenario. This is due to a moderate reduction of refuge management vehicle use and a slight reduction in visitation, should this alternative be implemented.

As discussed under Alternative 2 above, changes in refuge management and visitor use of administrative trails and roads should not measurably affect the level of soils impact from on-road and on-administrative trail driving.

Alternative 4 (Preferred alternative)

Implementing Alternative 4 would initially result in no change from the no action scenario level of soil disturbance from on-road and on-trail driving. Over time, however, as improvements to wildlife waters are completed, refuge management driving on roads and administrative trails would decrease up to approximately 60 percent, resulting in reduced levels of soil disturbance. No measurable change in the impact of visitor driving of refuge roads would result from implementing this alternative.

As discussed under Alternative 2 above, changes in refuge management and visitor use of administrative trails and roads should not measurably affect the level of soils impact from on-road and on-administrative trail driving.

Alternative 5

Implementing Alternative 5 would initially result in an increase in soil disturbance from on-road and on-trail driving. This alternative would increase visitation, and thus on-road driving by visitors, by approximately 10 percent, and would initially increase refuge management vehicular use of refuge roads of and administrative trails by approximately 20 percent. Similar to Alternative 4, however, as improvements to wildlife waters are completed, refuge management driving on roads and administrative trails would decrease by approximately 60 percent, resulting in reduced levels of soil disturbance.

As discussed under Alternative 2 above, changes in refuge management and visitor use of administrative trails and roads should not measurably affect the level of soils impact from on-road and on-administrative trail driving.

4.1.3.1.3 Construction

Construction activities that include soil excavation and vegetation clearing have the potential of greatly increasing erosion on disturbed sites. This potential can be mitigated through the use of best management practices (BMPs) for construction such as stabilizing disturbed soil with geo-textile fabrics, limiting the area of disturbance and promptly restoring grades and vegetation upon the completion of construction. Small construction projects disturbing less than one hectare (2.5 acres) of land and mitigated through the use of BMPs should not cause any significant impacts to the soil resource.

Alternative 1, No Action Scenario

No new construction is currently proposed on the refuge.

Alternative 2 and 3

Implementing either of these alternatives would not result in any new construction on the refuge.

Alternative 4 (Preferred alternative)

Implementing Alternative 4 would result in construction of an enlarged visitor center at the refuge, as well as redevelopment of 12 developed waters on the refuge to benefit management of Sonoran pronghorn and desert bighorn sheep. This redevelopment would include excavation of space for buried tanks and water lines.

The proposed refuge visitor center enlargement would involve disturbing less than one hectare (2.5 acre) of land on the refuge visitor center site. Erosion and sedimentation impacts will be mitigated through the use of BMPs. The impacts associated with this project would be short term, non-significant soil disturbance.

Redeveloping each water would require disturbance of an area of approximately 10 by 20 meters (33 by 66 feet). Redeveloping all 12 waters would thus involve temporarily disturbing 2,400 square meters (25,800 square feet) of the soil surface. This impact would be mitigated through the use of BMPs and the short period of disturbance, not more than three days for most installations. The impacts associated with the 12 redevelopment projects would be short term, non-significant soil disturbance.

Alternative 5

Implementing Alternative 5 would result in redevelopment of 12 developed waters on the refuge, as well as construction of some new developed waters. This construction would include excavation of space for buried tanks and water lines. Impacts of such redevelopment and development of new waters would be similar to those described above for Alternative 4. Under this alternative, pull-offs and two new developed campsites will be developed in non-wilderness along Charlie Bell Road. These development projects will involve disturbing less than one hectare (2.5 acres) of land and will be sited on areas with flat topography to minimize impacts. No significant impacts are anticipated.

4.1.3.2 Cryptogammic Soil

Cryptogammic soil crusts, also known as cryptogam, occur widely on valley floors in the refuge. These tiny, black, irregularly raised pedestals in the sand are self-sustaining biological communities essential to the ecology of arid lands. They reduce erosion, fix nutrients, and increase water absorption, creating a more hospitable environment for other plants. Cryptogammic soils are fragile and very susceptible to damage from trampling and compaction (National Outdoor Leadership School 1994). Potential impacts to cryptogammic soils are primarily related to back country recreational use and illegal off-road travel, both vehicular and pedestrian, in the refuge by smugglers and UDAs.

While no refuge-wide survey for cryptogam has yet been undertaken, it is possible to estimate the refuge base of potential of cryptogam habitat. This is essentially all of the refuge having a soil substrate, that is to say, something other than bare rock, coarse gravel or shifting sand (drainage ways and sand dunes). The extent of such habitat is somewhat more than one half of the total refuge area, or approximately 192,300 hectares (475,000 acres). Within suitable habitat, the coverage of cryptogam varies considerably from absent to near total coverage. As data on the presence of cryptogam is missing, this analysis considers any vehicle use, walking or pack/saddle stock use in cryptogam habitat as a potential impact to cryptogam. Due to the fragile nature of cryptogam and its importance as nutrient fixer and living mulch in desert ecosystems, disturbance of more than one percent of the refuge cryptogam habitat (1,923 hectares [4,750 acres]) is considered a significant impact.

The continuing impact of illegal travel on the refuge is uncertain. CBP-BP activity and personnel levels were greatly increased in the summer of 2004 as part of the Arizona Border Control Initiative (ABC) in an effort to control the flow of UDAs into Arizona. The ultimate outcome of this effort can not yet be determined.

Alternative 1, No Action Scenario

The greatest existing impacts to cryptogam result from illegal travel on the refuge, by UDAs and smugglers. The estimated area heavily impacted by illegal foot travel and vehicle use is 61,540 hectares (152,000 acres), or approximately 32 percent of the total cryptogam habitat on the refuge. This significant degradation of cryptogam habitat is beyond the control of refuge management. The ABC Initiative and proposed vehicle barrier may reduce future levels of degradation, allowing slow reestablishment and recovery of cryptogam. If effective, these provisions should be considered cumulative benefits of refuge management.

Under the no action scenario, a small amount of cryptogammic soil is trampled each year by visitors to the refuge back country. The number of backcountry visitors is small (of a total 3,000 or fewer refuge visitors each year, fewer than 5 percent, or 150, travel any distance from the public access corridors on foot), thus the impact is also small. Trampling of cryptogammic soil by legitimate backcountry visitors (a direct impact of refuge operation) should be considered negligible as compared to that caused by illegal foot and vehicle traffic on the refuge.

Alternative 2

Implementing this alternative would decrease the level of impact to cryptogammic soil by refuge visitors below that of the no action scenario, as visitation would drop under this alternative and Leave-No-Trace information provided to all refuge visitors would contain information about avoiding damage to cryptogam. Impacts for cryptogam from refuge visitors and management should be considered direct and long-term but not significant. The far greater impact of illegal travel on the refuge would remain unchanged under this and all other action alternatives.

Alternative 3

Implementing Alternative 3 would also decrease level of impact to cryptogammic soil by refuge visitors below that of the no action scenario, as visitation would be somewhat lower than the existing condition and Leave-No-Trace materials would given to all visitors. Once again, this impact would be non-significant and negligible when compared to the level of ongoing impact attributable to illegal travel on the refuge.

Alternative 4 (Preferred alternative)

Implementing Alternative 4 would increase the level of impact to cryptogammic soils by refuge visitors and refuge management slightly above that of the no action scenario. This potential increase reflects both a slight increase in visitation, mitigated by provision of Leave-No-Trace materials, and the possibility that some cryptogammic soils would be damaged during redevelopment of 12 developed waters. Overall impacts to cryptogammic soils that would result from implementing this alternative would be non-significant and modest, particularly in as compared to impacts caused by illegal traffic.

Alternative 5

Implementing Alternative 5 would increase the level of impact to cryptogammic soils by refuge visitors and refuge management above that of the no action scenario. This potential increase reflects an increase in visitation, a waiving of the requirement of a special use permit for pack stock, the possibility that some cryptogammic soils would be damaged during redevelopment of 12 developed waters, and the possibility

that some cryptogammic soils would be damaged during the construction of new developed waters. The impacts of pack stock are not expected to be great, as there has not been a high demand for horse or burro packing on the refuge. Once again, this impact would be non-significant, and modest, as compared to the level of ongoing impact attributable to illegal travel on the refuge.

4.1.4 Water Resources

4.1.4.1 Surface Water

There are no naturally occurring perennial bodies of water on the refuge. Natural surface water is limited to occasional rapid runoff events after rainstorms, ephemeral pools in playas and tinajas (depressions in rock that collect and hold water after rains). In addition to naturally occurring ephemeral surface waters, there are 34 developed waters for wildlife on the refuge. These include 11 tinajas (rock basins that collect and hold runoff), two charcos (dirt basins with associated storage tanks and metered drinking troughs), 10 wells with drinking troughs, 10 underground storage tanks with collections systems and drinking troughs, and one parabolic collector (a self-contained fiberglass water collection and storage vessel with a wildlife drinking opening). Some of the developed waters are entirely new sources of surface water, while others are enhancements to existing natural tinajas. The waters have been developed to benefit a focus species at the refuge (13 are targeted to supply water to desert bighorn sheep, 19 to Sonoran pronghorn and two supply water to both species), but also affect other species. Any additional water sources in the dry Sonoran Desert are noticed and exploited by a variety of wildlife species, as well as by smugglers and UDAs crossing the desert, as has been documented by automated cameras periodically placed at the waters. These developed waters, however, are not considered to measurably affect the overall refuge surface water hydrology, given their small size in the context of the refuge.

Significant impacts to refuge water resources are those that alter surface drainage patterns for an area exceeding 5 hectares (12 acres) or materially add or detract from the baseline water supply.

This analysis of surface water resources includes consideration of effects to drainage patterns and watersheds during dry conditions, as well as direct effects to water. Roads and administrative trails that cross drainage ways can introduce a new source of sediment and alter flow regimes by diverting runoff from natural channels into depressed roadways. While no alternative proposes development of new roads or trails, considerable road development is occurring on the refuge from illegal vehicle use. These new roads may intercept sheet runoff, diverting moisture from areas down-slope. This phenomenon, while not yet formally studied for demonstrated to occur on the refuge, has the potential to adversely affect vegetation down-slope from roads by capturing and diverting water supplies (Hall *et al.* 2001, R. DiRosa, USFWS, pers. comm.). The level of illegal road development that occurs on the refuge is beyond management control, and is not likely to vary among the management alternatives. Should border law enforcement operations and a vehicle barrier succeed in reducing or eliminating future illegal road development the refuge would work to restore the old illegal roads to their natural contour.

During the duration of an experimental study being conducted by the University of Arizona, three desert bighorn sheep waters in the Sierra Pinta Mountains, North Pinta, Eagle and Heart Tanks, received no supplemental water. The study terminated in 2005, due to shortage of funds. The refuge is currently evaluating the study results to determine if there is sufficient data make a determination of whether or not to resume hauling water to these tanks. This decision will reflect the study results and the management alternative implemented.

<u>Alternative 1, No Action Scenario</u>

Under the no action scenario, refuge staff maintains each of the developed waters and 25 are supplied, at least occasionally, with supplemental water during dry periods. These 25 (22 during the University of Arizona study) waters are perennial or nearly perennial water sources, and may be the only sources of

surface water on the refuge during much of the dry season. Although these water sources benefit many wildlife species (see discussion under 4.2, Habitat and Wildlife Resources), their overall importance in a landscape context is limited. All 34 waters, when filled to capacity, provide somewhat less than 0.1 hectare (0.25 acre) of water surface in a refuge of 348,182 hectares (860,010 acres).

Alternative 2

Implementing this alternative would result in cessation of maintenance and supplemental water supply to the 10 developed waters in wilderness desert bighorn sheep habitat. Refuge staff would continue to maintain and supply water to the Tule Well and Childs Mountain parabolic tank, two desert bighorn sheep waters outside of wilderness, the 19 developed waters in Sonoran pronghorn habitat, and the two waters used by both species.

The 10 developed waters not receiving maintenance or supplemental water would initially cease to be perennial surface waters, but several would hold water for varying periods after rainfall. Over longer periods they would likely become filled with sediment. The resulting reduction in capacity would shorten the period during which they hold surface water. While this reduction in refuge waters would affect wildlife populations, and might affect UDAs who use the waters in emergencies (see Sections 4.2, Habitat and Wildlife Resources and 4.7.2, Social Consequences), it would not be significant on a refuge-wide basis due to the very small area of surface waters that would be affected.

Alternative 3

Implementing Alternative 3 would result in continued maintenance of all 25 developed waters currently maintained by refuge staff. Developed waters in Sonoran pronghorn habitat would continue to receive supplemental water sufficient to keep them from going dry. The 10 waters (7 waters during the University of Arizona study) in wilderness desert bighorn sheep habitat, however, would receive supplemental water only during periods of extreme drought (defined as a Palmer Drought Index of less than negative three). Under this regime these 10 developed waters would likely go dry periodically, but would be ephemeral sources water after rains and after water hauling during extreme drought. As stated above for Alternative 2, the small decrease in perennial waters that would result from implementation of this alternative, while potentially affecting some species and UDAs transiting the refuge, would not be a significant change in refuge water resources due to the very small area of surface waters that would be affected.

Alternative 4 (Preferred alternative)

Implementing Alternative 4 would result in continued maintenance of and occasional water supply to all 25 developed waters currently maintained by the refuge (water will be supplied to 22 during the University of Arizona study). When the results of the study are available, the refuge may develop additional waters in desert bighorn sheep habitat or discontinue maintenance and water supply to some existing waters in that habitat, depending on the study results. The upgrades to developed waters proposed to enhancing their efficiency and reduce their visual impact should not alter their status as perennial surface water sources on the refuge.

The overall effect of implementing this alternative on refuge waters would thus be identical to that of the no action scenario.

Alternative 5

Implementing Alternative 5 would result in continued maintenance of and water supply to all 25 developed waters currently maintained by the refuge (water will be supplied to 22 during the University of Arizona study). Under this alternative four to six additional developed waters would be created in desert bighorn habitat in the Growler, Granite and southern Sierra Pintas Mountains. As in Alternative 4, upgrades to

developed waters proposed to enhancing their efficiency and reduce their visual impact should not alter their status as perennial surface water sources on the refuge.

The additional developed waters proposed in this alternative, while potentially benefiting desert bighorn sheep and other wildlife species, would not significantly alter the overall refuge water resources.

4.1.4.2 Ground Water

Ten wells on the refuge are either currently used to supply wildlife drinking water and irrigation water to Sonoran pronghorn forage enhancement plots or are scheduled for redevelopment for those purposes. The increased well pumping volume needed to irrigate forage plots may locally depress water tables in the eastern portion of the refuge, the volume of pumping proposed, however, is very small in comparison to residential well pumping in the town of Ajo, immediately east of the refuge. Ground water pumping would be the same under Alternatives 1 through 4 and slightly higher under Alternative 5.

4.2 HABITAT AND WILDLIFE RESOURCES

4.2.1 Biotic Community and Biodiversity

The refuge is located at the junction of two of the six subdivisions of the Sonoran Desert (Brown 1994), the Lower Colorado Valley and the Arizona Upland subdivisions. This provides relatively high plant and animal species diversity. The greatest threats to the biological community integrity and biodiversity historically have been changes in plant composition in responses over grazing by domestic animals (Hall *et al.* 2001) and wildlife disease introduced by domestic animal vectors (J. Morgart, UFWS, pers. comm.). Recent threats include proliferation of non-native invasive plant species and alteration of drainage patterns by illegal road development (Hall *et al.* 2001). According to estimates developed by refuge staff, approximately 3,900 hectares (9,600 acres) are infested with Sahara mustard; approximately 55 hectares (135 acres) are infested with fountain grass and buffelgrass occurs, at lower than infestation levels, on approximately 810 hectares (2,000 acres). Significant alterations of biotic community and biodiversity include any actions that would result in loss of any native species currently occurring on the refuge.

Alternative 1, No Action Scenario

In order to detect any changes in conditions, the refuge formerly operated eight meteorological instruments that recorded precipitation, temperature, and humidity. These instruments all became dysfunctional and cannot be used until funds are acquired for their repair. The refuge established vegetation transects in 2002 for repeat monitoring to detect changes in the refuge plant community. Between 30 and 60 head of cattle typically trespass on the refuge each year. When domestic animals are found on the refuge they are removed as quickly as possible, either by contacting the owner, if known, or by humane disposal.

Existing impacts to the biotic community and biodiversity include disruption of drainage patterns by illegal road creation in areas naturally characterized by sheet flow (as described above in Section 4.1.4.1, Surface Water), infestation by non-native plant species, lingering effects of past overgrazing, and introduction of invasive plant species and diseases by trespass domestic livestock. The first two impacts significantly affect the biotic community and biodiversity of the refuge. Past overgrazing, while having created significant changes to the refuge biotic community and biodiversity, currently has a slowly decreasing effect on the refuge, as the refuge habitats recover from overgrazing. Valone *et al.* documented that recovery of perennial grasses in desert grasslands can take considerably longer than 50 years after livestock removal (2001). The importance of trespass livestock effects is low, due to the low number of animals currently entering the refuge and the refuge's ability to remove the animals fairly quickly.

Drainage alteration through road creation is a direct result of illegal travel across the refuge by UDAs and smugglers and is well documented (see figure 4.1 for a map of road development). Illegal travels are also likely responsible for much spread of invasive plants, as the seeds and other propagules of such plants adhere to clothing and vehicles and can be spread from roadsides by travelers. As the volume of illegal travelers on the refuge far exceeds that of authorized visitors or refuge management travel, illegal travelers have the greatest potential to introduce invasive plant species. These two significant impacts to the refuge biotic community and biodiversity are beyond the scope of any controls proposed in the management alternatives. Should border law enforcement activities and future construction of a vehicle barrier greatly reduce the level illegal travel through the refuge, the cumulative result would be reduction in new invasive plants introduced into the refuge. Existing infestations would likely continue to flourish.

Climate and vegetation transect monitoring efforts are aimed at establishing a baseline of information on desert conditions, invasive species infestations and plant community composition. When baseline information has been established, changes can be detected and analyzed to allow management responses. The current monitoring program, however will not directly affect the refuge biotic community or biodiversity. Monitoring programs should yield indirect, long-term beneficial effects through fostering more efficient management.

Alternative 2

Under this alternative the programs of the no action scenario would be continued. The environmental consequences would be similar to those of the no action scenario.

Alternative 3

Under this alternative the programs of the no action scenario would be continued. Additionally, the refuge would invite partners to develop experimental desert restoration sites in refuge non-wilderness. If successful restoration techniques can be developed, they would be implemented to restore degraded sites on the refuge. Under this alternative the refuge would work with the Air Force and the Arizona Department of Transportation to develop wildlife travel corridors across BMGR and State Highway 87 to link fragmented habitats.

If desert restoration experiments prove to be successful, important restoration of native habitats could result, this would be a direct, long-term beneficial effect. Re-joining fragmented habitats via wildlife travel corridors could provide a long-term benefit to wide-ranging wildlife species such as Sonoran pronghorn. In the species' current severely depleted status, however, making additional habitat available would be of limited value, as the available habitat is more than sufficient for the existing size of the populations (Krausman 2004).

Alternative 4 (Preferred alternative)

Under this alternative, the refuge would implement the programs of the no action scenario. Additionally, the refuge and the Regional Office remote sensing scientist would implement a change detection analysis program.

This program would use aerial photography sampling (i.e., photography will be taken of a random sample of the refuge, as full photographic coverage of the refuge would be too large to effectively analyze). Analysis of photography would be completed every two years and comparison of photography from different years and archival photography would allow identification of changes in vegetation community composition and density. The data generated by this monitoring project would be tracked to identify existing sources of change and evaluate their causes and importance.

The refuge would also implement a program of inspecting staff clothing and vehicles for plant seeds prior to refuge entry to limit the spread of invasive plants.

The proposed change detection analysis would have no direct effect on refuge resources, but would allow identification of areas where unnatural changes in vegetation cover or composition are occurring. A management response could then be initiated. The program of inspecting clothing and vehicles for seeds, while appropriate, would probably have little impact compared with the volume of non-native plants introduced to the refuge by illegal entrants to the refuge. Some stakeholders have argued that supplying water to developed waters creates an artificial situation and detracts from ecological integrity. The Service believes management interventions such as supplying water sources can be consistent with restoring overall ecological integrity when wildlife populations have been decimated by outside, anthropogenic factors (Schroeder, *et al.* 2004).

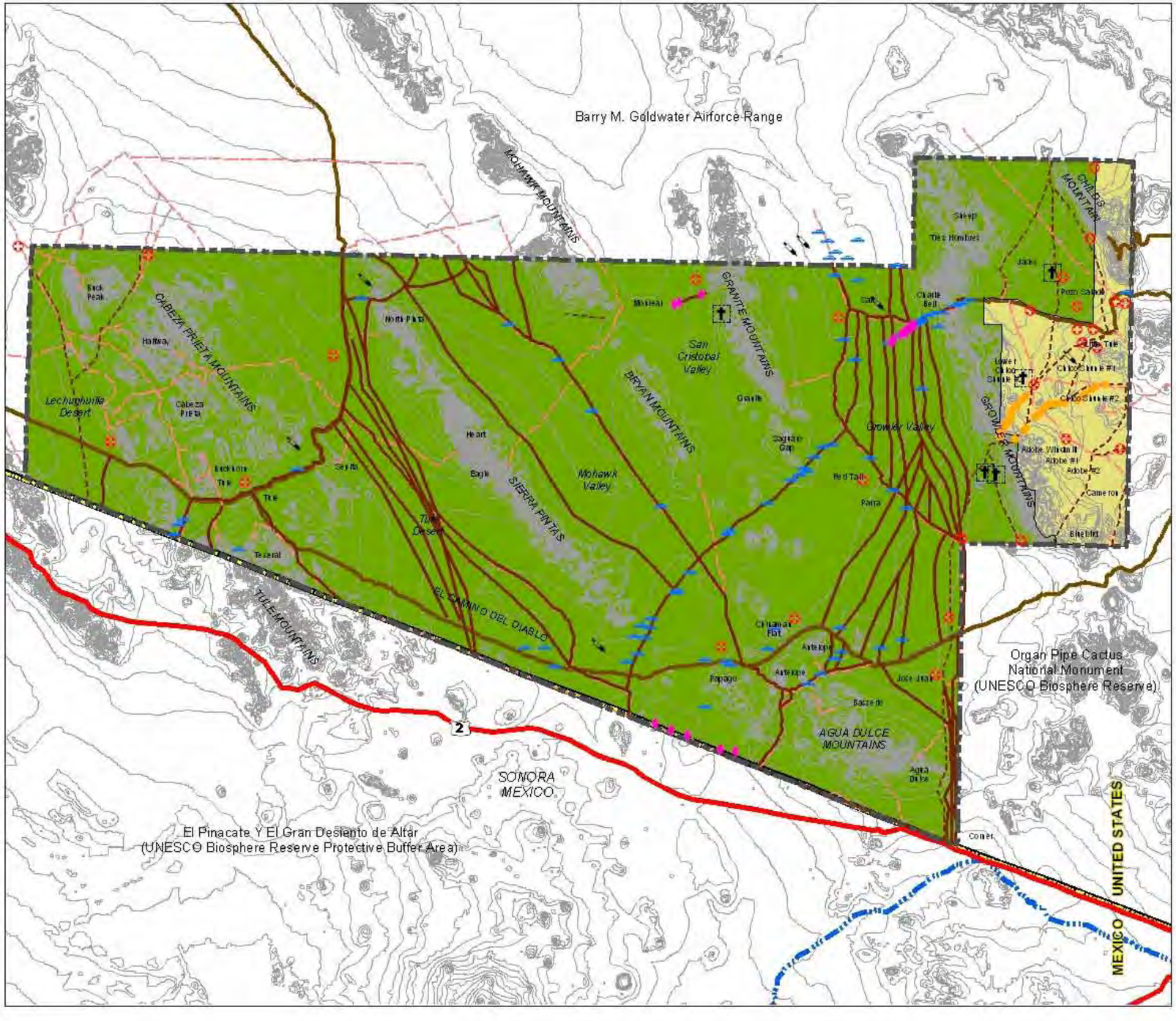


Figure 4.1 Areas of Disturbance Related to Illegal Border Crossing

Legend

- Cabeza Prieta N.W.R.
- Wilderness
- Non-Wilderness
- Public Roads
- Administrative Trails
- US/Mexico Border
- Highway
- Rio Sonoyta
- Illegal Vehicle Route
- Illegal Walking Route
- ATV/Motorcycle Tracks
- Trash
- Abandoned Vehicles
- Emergency Rescue
- Drug Seizure
- Death

Sources: USFWS, 2003

0 1.5 3 6 9 12 Miles

N

CABEZA PRIETA
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE

Alternative 5

In addition to the measures described for Alternative 4, the refuge would implement refuge-wide resource mapping. This mapping would allow positive identification of areas with degraded or intact ecological communities, facilitating remediation and study. Once again, this program would not directly affect refuge resource, but should have the indirect, long-term effect of enhancing restoration efficiency. The argument regarding supplying water discussed above for Alternative 4 also applies to this alternative.

4.2.2 Plant Resources

Current plant conservation efforts at the refuge are limited to monitoring and modest invasive plant control efforts.

Alternative 1, No Action Scenario

The refuge established vegetation transects in 2002 for repeat monitoring to detect changes in the refuge plant community. Refuge staff has been trained to recognize the most common invasive plant species that occur on the refuge and document their location when encountered in the field. The refuge controls small infestations of fountain grass, an invasive species with the potential to become widely established on the refuge, by hand pulling newly established patches as they are located.

As discussed above in section 4.2.1, Biotic Community and Biodiversity, the vegetation monitoring program would not yield any direct effect on refuge plant resources, but should yield indirect long-term benefits through allowing identification of trends and thus facilitating management responses. Hand pulling fountain grass should mitigate the negative effect that infestations of this invasive plant create upon the native plant community.

Alternative 2

The no action scenario monitoring and fountain grass programs would be continued under this alternative, yielding the same consequences.

Alternative 3

Under this alternative the programs of the no action scenario would be continued. Additionally, the refuge would invite partners to develop experimental desert restoration sites in refuge non-wilderness. If successful restoration techniques can be developed, they would be implemented to restore degraded sites on the refuge.

In addition to the consequences described above for the no action scenario, implementation of this alternative has the potential to benefit plant resource abundance and diversity, should effective desert restoration techniques be developed. This would be an indirect, long-term benefit for implementing Alternative 3.

Alternative 4 (Preferred alternative)

In addition to the programs of the no action scenario, this alternative would include the change detection analysis sampling described for Alternative 4 in Section 4.2.1, Biotic Community and Biodiversity above. Implementing this analysis program would not directly affect refuge plant resources, but it would allow rapid identification of changes in the refuge plant community and facilitate adaptive response to a greater than would the transect sampling described for the no action scenario. The net effect should be a long-term, indirect strongly positive result for refuge plant resources.

Alternative 5

This alternative would include the programs of the no action scenario, the change detection analysis sampling described above for Alternative 4 and refuge wide resource mapping. The resulting spatial data, used in conjunction with the change detection analysis, would allow even greater precision in identifying areas for management and remediation efforts. This would not cause direct effects on refuge plant resources, but should result in the greatest long-term, indirect benefit to refuge plant resources of any preferred alternative.

4.2.3 Mammals

The management programs for mammals are primarily described in the sections addressing Sonoran pronghorn, desert bighorn sheep, lesser long-nosed bat and California leaf-nosed bat. Any effect that reduces the mammalian diversity or decreases the population of a rare or declining mammal by more than 10 percent (to accommodate natural variation population levels) is considered significant.

Alternative 2

Cessation of water hauling to ten wildlife waters in wilderness desert bighorn sheep habitat, as proposed in this alternative, would adversely affect wildlife populations. Many species have become habituated to these water resources. While the exact amplitude of this impact is not readily ascertainable, many mammalian species other than desert bighorn sheep have been documented to use these waters (J. Morgart, USFWS, pers. comm.). Populations of these species would be adversely affected by allowing the water holes to go dry.

Alternative 3

Reduction of water hauling to ten wildlife waters in wilderness desert bighorn sheep, as proposed in this alternative would adversely affect wildlife populations. As mentioned above for Alternative 2, many species have become habituated to these water resources. While the exact amplitude of this impact is not readily ascertainable, many mammalian species other than desert bighorn sheep have been documented to use these waters (J. Morgart, USFWS, pers. comm.). Populations of these species would be adversely affected by allowing the water holes to go dry periodically.

Alternative 4 (Preferred alternative)

Under this alternative, the refuge would implement a population survey program for mule deer. If mule deer were determined to exist in populations large enough to sustain a hunt, a limited hunt would be established, when Sonoran pronghorn have recovered to the extent that such a hunt would not adversely affect pronghorn populations.

The population survey procedure would not directly affect the refuge mule deer population, but is proposed to gain additional knowledge of refuge wildlife resources. The direct effect of a mule deer hunt would be a reduction in the refuge mule deer population, as determined consistent with refuge management goals. Additionally, no hunts would be allowed for several years, given the endangered status of the Sonoran pronghorn and the requirement that any hunt not adversely affect that species.

Alternative 5

This alternative would implement the population survey and possible hunting program for mule deer described above for Alternative 4, as well as a potential small game hunt. The small game hunt would be expected to draw only a small number of hunters willing to hunt in wilderness for dove, quail and rabbit.

4.2.3.1 Federal Threatened and Endangered Species

4.2.3.1.1 Sonoran Pronghorn

As U.S. population of Sonoran pronghorn is critically endangered, any negative effect is considered significant

Alternative 1, No Action Scenario

The no action scenario and the five action alternatives all implement the Sonoran pronghorn recovery plan. The direct effects upon Sonoran pronghorn of implementing each should therefore be similar and positive. Differences in approach among the alternatives, however, result in some differences in effects.

Illegal cross-border travel through the refuge, as well as the law enforcement response to that activity, has undeniably effected the Sonoran pronghorn population. Refuge law enforcement personnel and field biologists report tremendous increases in illegal traffic through the refuge over the last five years (R. DiRosa, USFWS, pers. comm.). Although the numbers may be somewhat misleading due to recently increased enforcement efforts, records of apprehensions and arrests by the CBP-BP support this observation. Estimates of illegal travelers crossing through the refuge increased from 4,366 in 2001 and to 8,069 in 2002 (R DiRosa, USFWS, pers. comm.). While no estimates were available for 2003, refuge staff engaged in periodic aerial reconnaissance report that trail development in the Growler Valley increased dramatically between early 2003 and early 2004, suggesting continued increases in illegal traffic volume (C. McCasland, USFWS pers. comm.). As the volume of cross-border traffic has increased, so has the law enforcement effort, including high-speed chases in the refuge back country. As mapped by the refuge (see figure 4.1) much of the illegal traffic impact occurs in the Mohawk and Growler Valleys, which also have some of the highest Sonoran pronghorn use on the refuge. Due to the potential harm to Sonoran pronghorn caused by human presence those areas of OPNM, BMGR, the refuge and adjacent BLM recreation areas used by pronghorn have been closed to recreational access during the Sonoran pronghorn fawning season since 2002. The increased level of human activity in Sonoran pronghorn habitat related to illegal border traffic and its interdiction produces a significant impact on pronghorn. Additionally, as discussed above in Section 4.2.1, Biotic Communities and Biodiversity, the vehicle use in this area degrades vegetation, reducing the area's habitat value. These long-term, adverse effects on the population should be considered to exist for all management alternatives.

The ABC Initiative will increase border law enforcement use of motorcycles and all terrain vehicles in the Growler Valley. While the exact response of Sonoran pronghorn to humans or vehicles is not fully understood, fast moving, loud vehicles such as motorcycles have been documented to produce a strong flight response in Sonoran pronghorn (Hughes and Smith 1990, Krausman *et al*. 2001). Increased use of motorcycles and all terrain vehicles under ABC should thus have a negative impact on Sonoran pronghorn. This impact will be the same for all preferred alternatives and should be considered a significant, cumulative effect.

The recovery plan for Sonoran pronghorn calls for maintaining active radio collars on 10 percent of the U.S. population. Currently there are active radio collars on two pronghorn, Other components of the recovery plan currently implemented include continuing to provide perennial water sources within the Sonoran pronghorn habitat on the refuge, maintaining a semi-captive breeding enclosure, stocking the enclosure with local and Mexican sub-populations breeding stock, and experimental establishment of forage enhancement areas.

The consequence of having radio collars on only two Sonoran pronghorn is a reduced ability to monitor the population effectively and track movement of individual animals. Over time this handicap would erode management's knowledge of the population's response to various treatments or environmental conditions,

resulting in less effective management. The effect on the Sonoran pronghorn population is difficult to determine, but a long-term direct impact of reduced management efficiency leading to possible decreased population viability could occur. Adverse events, such as periods of extreme drought or disease outbreaks would have a greater decimating effect on the population due to reduced ability to identify and address populations' responses effectively.

The continued provision of perennial water sources and enhanced forage areas should produce a direct, long-term benefit to the Sonoran pronghorn population by increasing recruitment (the survival of fawns to breeding age) during periods of drought. Fox *et al.* conducted a study of water and nutrient content of forage in Sonoran pronghorn habitat in Arizona (2000). They concluded that water content of forage on the eastern third of the refuge was insufficient to meet Sonoran pronghorn water requirements during drought. Given that fawns, pregnant does and lactating does have greater water requirements than the species average (Krausman 2004), the need for perennial water and an enhanced forage base to maintain population recruitment is apparent. A recent study suggested that selective forage of chainfruit cholla cactus by Sonoran pronghorn during droughts, due to its potential water content, may reduce recruitment in the population, as this plant has little nutritional value, high selenium levels, and is probably not sufficient for growing fawns (Bright and Hervert 2005).

Alternative 2

Implementing Alternative 2 would continue the no action scenario provisions, with the addition of Sonoran pronghorn collaring operations in non-wilderness only when conditions are favorable. Low temperatures, recent rain and good forage condition are considered favorable conditions for collaring operations. Based on field experience Service and AGFD biologists believe that collaring operations in favorable conditions should not result in Sonoran pronghorn mortality from capture myopathy (J. Morgart, USFWS, pers. comm.). All collaring operations would take place outside of wilderness.

The only change in consequences from those of the no action scenario caused by implementing Alternative 2 would be the long-term gain in data on Sonoran pronghorn movements yielded from radio collaring. The proposed practice of collaring only animals found in non-wilderness data, however, could bias the data through selection of a non-representative sample of the population for collaring. This could result in a direct, long-term adverse effect on the U.S. population of Sonoran pronghorn, if biased sampling results in management responses that benefit only a small, non-representative subset of the population (Krausmann 2004).

Alternative 3

Implementing Alternative 3 would result continued water supply to developed waters in Sonoran pronghorn habitat, with the exception that water would be hauled to Jose Juan and Redtail Charcos only during periods of severe drought (Palmer Drought Index of negative three or lower). The recovery goal of having 10 percent of the U.S. Sonoran pronghorn radio collared would also be implemented, with capture and collar operations taking place when weather conditions are appropriate, with no restrictions on collaring in refuge wilderness.

This alternative would also implement actions focused on the Service's working with other agencies (BLM, Arizona Department of Transportation, Air Force) to encourage changes off-refuge to assist Sonoran pronghorn recovery. These changes would include eliminating fencing and establishing travel corridors for Sonoran pronghorn to the east and north, as well as establishing developed waters in BMGR non-wilderness areas adjacent to the refuge wilderness.

Alternative 3 would also support habitat restoration research in non-wilderness areas on the refuge. Any restoration techniques demonstrated to be successful would be implemented on disturbed sites on the refuge, upon receipt of environmental clearances.

Alternative 3 would implement annual pathogen sampling in the developed waters and predator study and control. Monitoring wildlife water catchments in the Sonoran Desert for pathogens has been recommended (Broyles 1995).

Implementing Alternative 3 would initiate radio collar studies of coyote, focusing on their use of refuge developed waters and movement in relation to Sonoran pronghorn. When Sonoran pronghorn population numbers are less than 100 and winter and spring precipitation is less than 50 percent of average, the refuge would initiate selective removal of coyote.

The overall effect of implementing Alternative 3 upon the U.S. Sonoran pronghorn population should be slightly superior to that of the no action scenario. Radio collaring pronghorn throughout their range on the refuge will allow more effective research and survey actions, without the sampling bias described under Alternative 2 above.

This alternative includes off-refuge actions that other agencies would be encouraged to undertake. The off-refuge placement of additional developed waters should improve the habitat if water is a limiting factor, as indicated by Fox *et al.* (2000). This benefit should be considered an indirect, long-term effect of refuge management. Establishing travel corridors to the north and east of the refuge could benefit the Sonoran pronghorn by allowing access to isolated portions of their former range, corridors generally have been considered beneficial when habitats are isolated or fragmented (Noss 1987). Any benefit from the corridors would not be realized in the short term, however, as currently available habitat should be sufficient to support the greatly depressed population of Sonoran pronghorn. The effect of the off-refuge corridors should thus be considered potentially positive, indirect, long-term effects.

The effect on Sonoran pronghorn of the proposed habitat restoration experiments and developed water pathogen monitoring are entirely dependent on the results of each. To date, habitat restoration projects on the refuge have been quite limited in size and have dealt with specific disturbed areas such as old roads. If experiments determine methods to restore large areas degraded by past overgrazing or encroachment of invasive species, benefits to Sonoran pronghorn, and other native wildlife would be great (Soule and Terborhg 1999). Refuge and AGFD staffs, however, are not optimistic about finding habitat restoration techniques for the refuge that involve acceptable levels of soil and plant disturbance (J. Morgart, USFWS, pers. comm., J. Hervert, AGFD, pers. comm.). The proposed pathogen monitoring in developed waters could yield benefits if pathogens harmful to Sonoran pronghorn are identified and eliminated. The necessity of monitoring developed waters on Cabeza Prieta; however, is questionable. Twelve developed waters at the nearby Kofa NWR have been monitored monthly for more than three years and no pathogens harmful to native wildlife have been detected (Krausman 2004). While the proposed water sampling may add to the body of knowledge concerning pathogens present in developed waters, it is unlikely to directly benefit the Sonoran pronghorn population.

The proposed coyote study and control should benefit the refuge Sonoran pronghorn population. Predation can be an important limiting factor on populations that are well below carrying capacity (Ballard *et al.* 2001), as is the case for Sonoran pronghorn on the refuge. The radio collaring studies of coyote proposed would increase the likelihood of effective coyote control through increased knowledge of coyote movements and den locations (Krausman 2004). This should be considered to yield a direct, long-term positive effect on the U.S. Sonoran pronghorn population.

The effect of restricting water deliveries to Jose Juan and Retail Charcos to periods of severe drought is questionable. These waters have been criticized as poorly suited for use by Sonoran pronghorn due to build-up of woody shrubs. Some pronghorn use of the charcos has been documented, however (J. Morgart, USFWS, pers. comm.). Allowing any developed water that has been used by Sonoran pronghorn to go dry is likely to cause negative effects on the population if water is limiting.

Alternative 4 (Preferred alternative)

Alternative 4 would implement annual pathogen sampling in Sonoran pronghorn developed waters, predator studies/control, and radio collaring of Sonoran pronghorn without wilderness restrictions as described above for Alternative 3. Implementing Alternative 4 would also result in refuge-wide survey for sites appropriate for additional Sonoran pronghorn developed waters, and development of additional waters at appropriate sites. Implementing Alternative 4 would also result in location and development of additional forage enhancement plots. Otherwise, this alternative would implement the Sonoran pronghorn recovery plan in the same manner as under the no action scenario.

The overall effect of implementing this alternative on the U.S. Sonoran pronghorn population would be similar to that of the no action scenario, with the additional positive impacts of unbiased radio collaring as described above for Alternative 3.

Alternative 5

Beyond the standard measures of the Sonoran pronghorn recovery plan included in all proposed management alternatives, implementing Alternative 5 would result in the following activities. The refuge and AGFD would conduct annual population surveys for Sonoran pronghorn, rather than the two-year survey interval currently used. More frequent surveys would allow more accurate tracking of the population and rapid identification of any population trends. This, in turn, would help in gauging population response to recovery activities. Implementing Alternative 5 would result in refuge-wide survey for sites appropriate for additional Sonoran pronghorn developed waters, and development of additional waters at appropriate sites. Implementing Alternative 5 would also result in location and development of additional forage enhancement plots. Finally, Alternative 5 would also implement annual pathogen sampling in Sonoran pronghorn developed water and predator studies/control, as described above for Alternatives 3 and 4.

Implementing Alternative 5 would provide additional beneficial effects to the U.S. Sonoran pronghorn population beyond those described for the no action scenario. Decreasing the population survey interval to one year would allow enhanced understanding of the relationship to environmental variable such as management treatment to basic life history through more up-to-date population size estimates (Caughley 1977). The availability of accurate, annual population estimates would facilitate fine-tuning of management treatments, resulting in a direct, and long-term positive effect on the U.S. Sonoran pronghorn population. Providing additional forage enhancements and developed waters should result in a direct, and long-term positive effect as well, if water and forage are limiting factors on the U.S. Sonoran pronghorn population, as is suggested by Fox *et al.* (2001).

4.2.3.1.2 Lesser Long-Nosed Bat

During June of 2003, the maternity colony of lesser long-nosed bats largely abandoned the known maternity roost on the refuge. A survey conducted in May 2003 found approximately 4,500 adult bats using the roost. This is slightly higher than average use. After the abandonment in June, only 100 to 200 bats remained. Refuge biologists believe that many bats abandoned the roost due to excessive human use of its entry. Signs identified by refuge biologists suggest that smugglers frequently use the roost entrance as a shelter or storage area (C. McCasland, USFWS, pers. comm.).

Alternative 1, No Action Scenario

Current management includes occasional law enforcement surveillance of the roost site to apprehend anyone using the roost for illegal activities and visits by biologists to confirm bat use of the roost. In the early spring of 2004, the refuge installed a steel fence ranging from 2.5 to 3 meters (8 to 10 feet) high around the roost entrance to discourage human entry. The fence is constructed of 2.5-centimeter (1-inch) vertical pipes welded to cross pipes at 13 centimeter (5 inch) intervals. The tops of the vertical pipes are cut at an

angle to produce a sharp point and the top 30 centimeters (12 inches) of the pipe is bent outwards. The sharp tops and outward bend should make climbing over the fence difficult. This fence should provide an immediate positive effect to bats that were displaced by human interference. Spring, 2004 reconnaissance indicated that approximately 4,000 female bats had returned to the roost. This return to historically high use of the roost suggests that, at least in this case, bats will return to a largely abandoned roost when human use is restricted.

All of the management alternatives include survey for additional lesser long-nosed bat maternity roosts on the refuge. Survey for maternity roosts is a recovery effort established in the species' recovery plan. Bats have been observed entering and exiting several small abandoned mine adits near the primary roost, but maternity use of these smaller adits has not been confirmed.

Alternatives 2 and 3

Alternatives 2 and 3 would include development of public information about the benefits of bats, such as plant pollination. While such information might be effective in fostering public support of bat conservation, it would likely have no beneficial effect on bats using the roost, as individuals using the roost in support of illegal activities would not be likely to be influenced by information about bats.

Alternative 4 (Preferred alternative) and 5

Under these alternatives a gate would be installed on the entrance to the roost, should unauthorized users circumvent the fence. The gate would be locked open during the bat's breeding and rearing season, as juvenile lesser long-nosed bats are poor fliers and are unable to pass through any grate that will prohibit human entry. The gate will contain grates passable by adult lesser-long nosed bat so that any bats that arrive early in the spring while the gate is still closed can access the roost. When bats are absent during the winter the gate will be locked closed to disrupt of human use. The gate would be a "second line of defense" to further deter any habitual users of the roost entrance who devise a method of climbing over or otherwise circumventing the fence.

4.2.3.2 Species of Conservation Concern

4.2.3.2.1 California Leaf-Nosed Bat

The management alternatives do not prescribe any specific management activities for conservation of this species. Populations of this species on the refuge are protected from mining and urban development, the greatest threats to the species. This protection from mining and urban development should be considered a direct, long-term, positive effect on any populations of California leaf-nosed bat occurring on the refuge, under all management alternatives.

4.2.3.3 Desert Bighorn Sheep

The desert bighorn sheep is considered a refuge focus species due to the large role that concern over the species' conservation played in establishing the refuge in 1939. The approach to managing desert bighorn sheep and the numerical population goals developed for sheep are major differences among the four action alternatives. Any effect that would reduce the long-term viability of desert bighorn sheep on the refuge is considered to be significant. The cumulative effect of noise and disturbance from illegal traffic through the refuge and the border law enforcement response is considerably less important for desert bighorn sheep than that described above in Section 4.2.3.1.1 for Sonoran pronghorn. Desert bighorn sheep occupy steep, mountainous habitat much less suitable for human travel than do pronghorn, so the impact of illegal traffic and law enforcement response is spatially distant from desert bighorn sheep, other than in mountain passes.

Alternative 1, No Action Scenario

Under the no action scenario there is no established numerical goal for the refuge desert bighorn sheep population. The refuge manages rather to sustain a "healthy breeding population of desert bighorn sheep." Population estimates for the period 1993 though present (the only period when reliable estimates are available) range from a low of 323 sheep to a high of 480 sheep. The 95 percent confidence interval for these estimates ranges from 228 to 958 sheep (see table 3.4 in Chapter 3).

Present management actions for Desert Bighorn sheep include development of, maintenance of, and supply of water to 15 developed waters in sheep habitat; aerial population surveys every three years; an annual limited sheep hunt; and an experiment by the University of Arizona investigating sheep movement in response to water availability, currently in the data analysis phase. The water available in the developed waters surely is used by populations of many mammal species, although the exact effect of such use is not known.

The result of refuge management has been an increase in desert bighorn sheep population to a level considerably greater than the available estimates of 100 to 150 sheep at refuge establishment in 1939. The recent trend documented by consistent survey methods, however is of a steady, slow, decline in the refuge desert bighorn sheep population between 1993 and 2002, followed by a small increase in 2005. The decline roughly coincides with a period of drought in southwestern Arizona, and decreases in desert bighorn sheep may reflect decreased forage quality during dry periods.

The refuge has allowed a controlled hunt of desert bighorn sheep rams since 1968. The number of hunt permits is limited (it has ranged from 1 to 7 hunt permits per year since 1986) and tied to the refuge sheep population. Desert bighorn rams are hunted as trophy animals. Due to the rigorous conditions of hunting in the Cabeza Prieta wilderness, and the fact that only one desert bighorn ram hunting tag is issued to an individual in a lifetime, only old rams with large horns are typically taken by hunters on the refuge (J. Morgart, USFWS, pers. comm.). Such "trophy animals" are generally aged 10 to 16 years and have limited remaining breeding potential; their removal is considered to allow younger rams to become active breeders and not adversely affect population dynamics (Kelly 1980). The controlled hunt is thus not anticipated to result in any measurable decrease in the desert bighorn population, other than the removal of the animals actually taken, which are considered to be excess animals near the ends of their life spans.

Alternative 2

Implementing Alternative 2 would involve the adoption of a desert bighorn sheep population goal of 100 to 200 animals. This goal reflects the likelihood of a reduction in sheep population resulting from reduced management.

Under Alternative 2, the refuge would also cease to maintain and supply water to all of the desert bighorn waters in wilderness other than Charlie Bell Well and Bassarisc Tank, which are also used by Sonoran pronghorn. Other than these waters, the only developed water in desert bighorn sheep habitat that would continue to be maintained and supplied with water would be Childs Mountain Parabolic Collector, in non-wilderness. This alternative would include monthly aerial monitoring of the areas around each of the developed waters to identify any increase in mortality or changes in desert bighorn sheep movement in response to the cessation of water hauling. A final difference in management between this alternative and the no action scenario is that under Alternative 2 no desert bighorn sheep hunting would be allowed on the refuge.

The consequences to the refuge desert bighorn sheep population of implementing Alternative 2 would be a reduction in population size, potentially to a non-sustainable level susceptible to extirpation. Eliminating water hauling to and maintenance of developed waters in desert bighorn sheep habitat throughout the Cabeza Prieta wilderness would result in some or all of the waters going dry during annually or during

droughts. The precise consequences of this on refuge desert bighorn sheep populations is difficult predict, given the lack of data regarding water use by sheep. Krausman suggests that the proposed cessation of water hauling and maintenance could cause a decline in the desert bighorn sheep population, if water is a limiting factor (2004). While verification that water is limiting factor on the refuge has not been undertaken, water has typically been viewed as a limiting factor for desert bighorn sheep by researchers. Turner and Weaver state: "Lack of water is the single most limiting factor for bighorn herds in the desert. Bighorn will reluctantly move away from an area with a dried water source and attempt to reestablish themselves around a different water hole" (1980). Observations by multiple researchers suggest that desert bighorn ewes have "home waters" that they use repeatedly over many years (Simmons 1980). As the refuge developed waters have been supplying perennial or near perennial water for many years, ceasing to haul water may remove resources used habitually by the refuge desert bighorn sheep population. Finally, a group of academic wildlife biologists, state wildlife managers and federal wildlife biologists convened in 2000 to discuss long-term management of desert bighorn sheep at the refuge, were asked to predict the consequences of removing developed waters at the refuge. Although their responses varied, a consensus formed that the result would be population decreases, with increased possibility of eventual extirpation (Morgart unpublished data).

The potential for decreased numbers of desert bighorn sheep, should this alternative be implemented, should be considered a significant, direct, long-term consequence of the refuge management. The potential (although by no means certain) extirpation of the refuge desert bighorn sheep population should be viewed as an irretrievable loss of resources. Although a new population could be established through reintroduction from other existing stocks, the unique genetic characteristics of the refuge population would be lost.

Alternative 3

Implementing Alternative 3 would result in a refuge population goal for desert bighorn sheep of 250 to 300 animals. This range represents a density of animals per unit area of habitat roughly one half that of the prevailing average for desert bighorn sheep in Arizona. Lower density is considered appropriate given the moderate level of management intervention under this alternative. This range is within the 95 percent confidence interval for refuge population estimates (228 to 958), although it is lower than the lowest annual population estimate determined using the modern survey protocols (323).

Alternative 3 would include restriction of hauling water in wilderness to developed waters in desert bighorn sheep habitat. Such hauling would not be eliminated entirely, but rather restricted to times of severe drought (defined as times when the Palmer Drought Index value is negative 3 or less). In addition to limited water hauling in wilderness, Alternative 3 would implement a survey of non-wilderness desert bighorn sheep habitat on the refuge (the southeastern Growler Mountains and the eastern portion of Childs Mountain) for suitable water development sites. The refuge would continue to maintain and haul supplemental water to Charlie Bell Well and Bassarisc tank, which are used by Sonoran pronghorn as well as desert bighorn sheep, and the Childs Mountain parabolic collector, in non-wilderness.

Desert bighorn sheep hunting would continue to be permitted under this alternative, but only during years in which no drought-triggered water hauling occurred.

Many of the same concerns about disrupting habitual use of developed waters discussed for Alternative 2 apply to Alternative 3. Alternative 3's provision of water hauling during periods of severe drought, however may somewhat ameliorate those concerns, particularly if water should prove to be a limiting factor for desert bighorn sheep only during years of extreme drought. Conversely, if sheep become unaccustomed to using waters that periodically dry during moderate drought or between rains during average years, then supplying water during extreme drought years may have no benefit to desert bighorn sheep, because they would no longer be habituated to visiting the waters during dry periods. Some researchers have questioned the appropriateness of using the Palmer Drought Index in the Sonoran Desert due to high variability of rainfall with the region (Krausman, 2004).

This alternative would initiate predator studies, focusing on mountain lion and using radio collars to monitor predator movement and use of developed waters. This research is appropriate given documentation of recent mountain lion predation on the refuge (J. Morgart, USFWS, pers. comm.), and questions regarding water developments serving as predator sinks (Broyles 1995). Krausman states that a study to examine the predation relationship of desert bighorn sheep and mountain lion would be of value, but cautions that the study would be plagued by small sample size of mountain lions (2004).

The overall consequences to the refuge desert bighorn population of implementing Alternative 3 would likely be a direct, long-term decrease in population from that sustained under the no action scenario, but the magnitude of this decrease would be less than under Alternative 2.

Alternative 4 (Preferred alternative)

Implementing Alternative 4 would establish a refuge population goal for desert bighorn sheep of 500 to 700 animals. This range is within the 95 percent confidence interval for refuge population estimates observed during modern population surveys (228 to 958), although it is greater than the highest annual population estimate determined using the modern survey protocols (480). Krausman criticizes the range as possibly being too high to be maintained during times of drought (2004).

The initial water management regime under Alternative 4 would essentially maintain the no action scenario. The refuge would maintain and haul water to each of the developed waters in desert bighorn sheep habitat with the goal of preventing any water from going dry. In the longer term, this alternative would include upgrading each of the existing developed waters in wilderness to increase their water collection efficiency, reduce evaporation and reduce visual intrusion. When the results of the University of Arizona study of sheep movement in response to water availability, or other research, are available, the refuge will evaluate adding additional waters for desert bighorn sheep, or closing some of the existing waters, as indicated by research results. While a desert bighorn sheep management activity, closing some waters would likely have a detrimental effect on local populations of other wildlife species.

Alternative 4 includes a predator study program, as described for Alternative 3, and would maintain the desert bighorn sheep hunt program described for the no action scenario. Alternative 4 includes provisions for predator hunts on the refuge, but only when it has been determined that such hunting would not adversely affect the refuge Sonoran pronghorn population.

In the short term, the overall consequences to desert bighorn sheep of implementing Alternative 4 would be very similar to those of continuing the no action management scenario. The direct, long-term consequences to desert bighorn sheep of implementing this alternative should be superior to those of the no action scenario for two reasons. First, the findings of the University of Arizona water use study and other research would be used to identify beneficial water supply strategies. Second, development of improved water structures would allow water supply with less use of motor vehicles in desert bighorn habitat, thus reducing overall disturbance of sheep

Alternative 5

Implementing Alternative 5 would establish a refuge population goal for desert bighorn sheep of 900 to 1,200 animals. If 75 percent of this goal is not achieved within 15 years the refuge will be stocked with animals from other areas. This range overlaps only slightly with the 95 percent confidence interval for refuge population estimates (228 to 958). Seventy-five percent of the lower end of the goal is 675. Using the 95 percent confidence interval for the refuge population estimate, this number has been within the population estimate for three of the four years in which populations surveys were taken. It is thus unlikely that refuge stocking from off-site will occur.

The initial water management regime under Alternative 5 would essentially maintain the no action condition. The refuge would haul water to each of the developed waters in desert bighorn sheep habitat with the goal of preventing any water from going dry. In the longer term, however, this alternative would result in development of additional waters in desert bighorn sheep habitat on the refuge, particularly in the Growler Mountains and the southern Sierra Pintas. This alternative would implement a program of redeveloping the existing desert bighorn sheep waters to increase their water collection efficiency, reduce evaporation and reduce visual intrusion. The refuge would also install photovoltaic powered water level sensors with remote transmission capability, if available, to monitor the developed waters. Such sensors would facilitate ensuring that the developed waters do not go dry while avoiding any unnecessary hauling trips.

This alternative would also include forage enhancement for desert bighorn sheep. The refuge would survey desert bighorn sheep habitat for valleys or canyons in the mountain ranges that would be suitable as forage enhancement areas. Either by subtly redirecting runoff (in wilderness) or simply irrigating from a well, these areas would receive enhanced water supplies that would stimulate growth of grass or forbs as a source of additional sheep forage.

Alternative 5 includes a predator study program, as described for Alternative 3. Under Alternative 5, however, should the study program detect negative consequences to desert bighorn sheep from mountain lion predation, the refuge would initiate mountain lion control.

In the short term, the overall consequences to desert bighorn sheep of implementing Alternative 5 would be very similar to those of continuing the no action management scenario. The long-term consequences are more difficult to ascertain. The proposed additional developed waters should benefit the desert bighorn sheep population, provided that water is a limiting factor. It is the profession opinion of refuge biologists that otherwise suitable desert bighorn sheep habitat currently supports depressed populations due to the lack of reliable water sources. New water sources in the desert would also have the potential to increase some populations of other wildlife species. The consequences of the proposed forage enhancements would also not be easily determined. Proponents of this approach endorse it as having the potential to increase refuge carrying capacity for desert bighorn sheep (J. Hervet, AGFD, pers. comm.). Krausman, however, suggests that it is an unproven technique that approaches artificial feeding (2004). Artificial feeding can have negative consequences including the potential for disease transmission, disruption of animal movement patterns and distribution, alteration of community structure and general degradation of habitat (Dunkley and Cattet 2003). The proposed mountain lion control activity would have no beneficial effect desert bighorn sheep unless such predation is a limiting factor, considered unlikely by Krausman (2004). The provision to introduce animals from off-refuge populations if population goals are not met could negatively affect the refuge population through introduction of animals adapted to other conditions. Relocation of animals to under stocked or vacant habitats, however, has proven a successful management method for increasing desert bighorn sheep numbers in the Southwestern United States (Hansen *et al.* 1980)

The overall direct, long-term consequences to the refuge desert bighorn sheep of implementing Alternative 5 are thus difficult to ascertain given the presently available information. While there is some controversy regarding forage enhancement and predator control, the overall effect of implementing this alternative should be an increase in the refuge desert bighorn sheep population.

4.2.4 Birds

4.2.4.1 Species of Conservation Concern

4.2.4.1.1 Cactus Ferruginous Pygmy-Owl

The formerly endangered cactus ferruginous pygmy-owl has been recorded twice on the refuge. Currently (Alternative 1), refuge biologists conduct surveys for the owl periodically, as schedules allow. This practice

would continue under Alternatives 2 and 3. The direct consequences to cactus ferruginous owl of periodic monitoring are negligible. Should the monitoring program detect individual owls nesting on the refuge, conservation measures could be implemented and some positive affects could result. Thus the current monitoring, and that proposed under Alternatives 2 and 3 could yield indirect, long-term positive consequences for cactus ferruginous owl.

Implementation of Alternatives 4 (Preferred alternative) or 5 would result in development and use of a standard protocol for cactus ferruginous pygmy-owl surveys on the refuge. The use of a standard protocol may slightly increase the likelihood of verifying that the owl uses the refuge. The direct consequences to cactus ferruginous pygmy-owl of implementing Alternatives 4 (Preferred alternative) or 5 would be negligible. The monitoring program proposed under these alternatives, however, would have a greater likelihood of verifying the any presence of the species on the refuge, than would program of the no action scenario and alternatives 2 and 3. There would be thus a greater likelihood of indirect, long-term positive effects to cactus ferruginous pygmy-owl under Alternatives 4 (Preferred alternative) or 5 than under the no action scenario or alternatives 2 or 3. These effects would only occur, however, if the species uses habitats on the refuge.

4.2.4.1.2 Other Species of Conservation Concern

Some monitoring of various species identified as indicators of Sonoran Desert health by the Arizona Partners in Flight program or as Birds of Conservation Concern by the Service's Office of Migratory Bird Management would be conducted under each of the management alternatives. As discussed above for cactus ferruginous pygmy-owl, monitoring alone would not directly affect any of the species. The data gained by monitoring, over time, should inform management decisions. Monitoring should thus have an indirect, long-term beneficial effect on the monitored species.

Alternative 1, No Action Scenario

The refuge monitors LeConte's thrasher nests for reproductive success, renesting attempts and nest site characteristics. The Arizona Partners in Flight program lists this species as an indicator of Sonoran Desert health.

Alternatives 2 and 3

The refuge would continue to monitor LeConte's thrasher nests as described for the no action scenario.

Alternative 4 (Preferred alternative)

Under this alternative the refuge would continue to monitor LeConte's thrasher nests and also initiate additional bird monitoring. The new monitoring would include point counts for loggerhead shrike, Bell's vireo, gray vireo, crissal thrasher, yellow warbler, black-chinned sparrow and sage sparrow; determination of the age/size class of saguaros used by nesting by Gila wood pecker and glided flicker and collection of natural history information regarding cactus ferruginous pygmy-owl. The refuge would also monitor for golden eagle, prairie falcon and raven.

This enhanced monitoring would provide information on the status of several species listed by the Arizona Partners in Flight as indicators of Sonoran Desert health.

Alternative 5

Under this alternative the refuge would continue to monitor LeConte's thrasher nests and also initiate additional bird monitoring. The new monitoring would include distribution and status surveys for elf owl, Gila woodpecker, gilded flicker, loggerhead shrike, Bell's vireo, gray vireo, crissal thrasher, black-chinned

sparrow and sage sparrow; point counts for yellow warbler; determination of the age/size class of saguaros used by nesting by Gila wood pecker and glided flicker; study of habitat use by black-chinned sparrow, sage sparrow and Costa's hummingbird and investigation of natural history, juvenile dispersal, home breeding range and habitat use by cactus ferruginous pygmy-owl. The refuge would also monitor for golden eagle, prairie falcon and raven.

4.2.5 Reptiles and Amphibians

Alternative 1, No Action Scenario

The refuge will continue to survey abundance, distribution and breeding potential of amphibians, especially in developed waters. This survey should provide information about use of the developed waters by amphibians, but would provide little information about other use of refuge habitats by reptiles and amphibians.

The on-going amphibian surveys have no direct effect on the refuge amphibian populations. There are few potential indirect benefits to the populations, as no protected amphibian populations known on the refuge and management actions driven by other priorities, such as cessation of water hauling, are unlikely to be altered due to concerns over refuge amphibians.

Alternatives 2 and 3

No monitoring for reptiles or amphibians, other than described for the no action scenario, would be implemented under these alternatives.

Alternatives 4 (Preferred alternative) and 5

In addition to monitoring for amphibians as described for the no action scenario, under these alternatives the refuge would implement surveys for Gila monster, desert tortoise, chuckwalla, canyon spotted whiptail and rosy boa. The refuge would survey for the presence of flat-tailed horned lizard, an Arizona Special Status Species that has been documented to occur on Marine Corps lands to the west of the refuge.

This monitoring should provide valuable information about the presence and abundance of several reptile species on the refuge. While obtaining this information would not directly affect the reptile species in question, the data generated should establish a baseline for reptile species conservation programs. The ultimate effect of these alternatives should thus be indirect, limited positive long-term benefit to refuge reptile populations.

4.2.6 Invertebrates

No specific monitoring or management actions related to invertebrates would be proposed under the no action scenario or any of the action alternatives. Observations by refuge staff visiting developed waters for monitoring or water hauling suggest that non-native honeybees are plentiful around waterholes. A determination of whether honeybees are supported by developed waters at significantly higher levels than would otherwise exist, and if so, what effect this has on native invertebrates and plant pollination, is a suitable topic for future investigations.

4.2.7 Desert Pupfish

Although the endangered desert pupfish does not occur naturally anywhere on the refuge, a population of these fish is maintained in a refugium on the visitor center site. Native pupfish populations off-refuge should not be directly affected by the refugium. Should some of the native populations suffer extirpation or

extinction, however, a refugium population at the refuge would be important in reestablishing populations in the wild and recovering the species.

4.3 SPECIAL MANAGEMENT AREAS

4.3.1 Natural Register of Historic Places

One refuge resource is listed on the National Register of Historic Places. This is the El Camino del Diablo Trail National Register District, which crosses the southwestern portion of the refuge. This district is roughly one mile wide and is centered on the multiple paths of the original migrant trail. The trail does not exactly correspond with the path of the modern refuge road bearing the same name. Vestiges of the original trails, as well as the graves of travelers who died on the trail (mostly between the late Eighteenth and mid Nineteenth Centuries) are visible within the historic district. Any impacts to this resource are that eradicate vestiges of the historic trail are considered significant.

Under Alternative 1, the no action scenario, illegal traffic through the refuge has created the greatest damage to the historic character of the El Camino del Diablo Trail National Register District. Trail development by smugglers and UDAs crossing the district from north to south has obscured some of the wheel ruts left from early travelers. This degradation creates an irreversible and irretrievable loss of cultural resources. No change to this situation would be anticipated under any of the action alternatives. If an effective vehicle barrier is constructed along or near the refuge border (see Section 4.1.3.1.1, Off-road Vehicle Use, above), the resulting decrease in off-road illegal vehicular traffic should greatly reduce the level of future impact to this cultural resource, this would be considered a beneficial cumulative effect of refuge management.

4.3.2 Wilderness

The Arizona Desert Wilderness Act of 1990 designated 325,133 hectares (803,418 acres) of the refuge as federal wilderness. Under the provisions of the Wilderness Act of 1964 the wilderness character of these lands must be preserved. Although wilderness character is not defined in the Wilderness Act it generally is considered to include the following four traits:

- ***Untrammeled*** - wilderness is ideally unhindered and free from intentional modern human control or manipulation
- ***Natural*** - wilderness ecological systems are substantially free from the effects of modern civilization
- ***Undeveloped*** - wilderness has minimal evidence of modern human occupation or modification
- ***Outstanding opportunities for solitude or a primitive and unconfined type of recreation*** - wilderness provides opportunities for people to experience natural sights and sounds, solitude, freedom, risk, and the physical and emotional challenges of self-discovery and self-reliance (Leopold Institute 2004).

Section 2 (c) (4) of the Wilderness Act of 1964 established seven values of wilderness that contribute to wilderness value: recreational, ecological, geological, scientific, educational, scenic and cultural/historical.

As the largest National Wildlife Refuge Wilderness outside of Alaska, the Cabeza Prieta Wilderness has been a lighting rod for criticism, and support, of the Service's administration of designated federal wilderness (Ekker 2000). Due to this heightened national interest and controversy, wilderness impacts at Cabeza Prieta have greater contextual importance than would similar impacts occurring on a more obscure wilderness area. Impacts that permanently alter any of the attributes of wilderness character or wilderness value, or have a high potential to alter wilderness visitor's sense of wilderness character or values are considered significant.

Five general types of activity occurring on the refuge affect wilderness character and values. These are

military aircraft operating at low altitudes over the refuge, travel by UDAs and smugglers, border law enforcement, refuge management, and visitor use. Although the refuge has no direct control over military flights, illegal travel or border law enforcement, these activities considerably affect the wilderness resource. The consequences of these activities are analyzed for the no action alternative and remain little changed for the four proposed action alternatives.

In addition to current or proposed activities, some past activities have left artifacts or resource damage that affect wilderness character. Examples include military debris, some remnant cattle fencing, old vehicle tracks and changes in vegetative cover that have resulted from past cattle grazing.

4.3.2.1 Military Training

Under current management (No Action Alternative), military jet aircraft frequently over-fly the refuge at low altitudes (152 meters [500 feet] above ground level [AGL] on training routes and 457 meters [1,500 feet] AGL generally), and military helicopters less frequently over-fly the refuge at very low altitudes. Although military use of airspace above the refuge wilderness is consistent with the Arizona Desert Wilderness Act of 1990, and the Wilderness Act of 1964 does not include airspace above designated wilderness, the flights negatively affect wilderness solitude, recreational and scenic values. Noise impacts on the ground at the refuge from low altitude flights generally range between 45 and 55 decibels (dB), and range up to 100 dB for fighter aircraft at 152 meters (500 feet) AGL (USDOD 1998). The average range is somewhat below the noise level of typical conversation, but the higher value approximates that experienced by the operator of snowmobile or motorcycle (Noise Center 1996). In either case, aircraft noise is highly perceptible in the otherwise very quiet setting of the refuge wilderness, and adversely affects the visitor's sense of naturalness and solitude. While individual noise impacts from aircraft are short-term in duration, their recurrent nature renders them significant, long-term impacts for the life of the plan.

No change in military over-flight activities would occur under any of the action alternatives.

Many tow darts, previously used in air-to-air gunnery practice, litter some areas of the refuge wilderness. While the actual area of ground disturbance caused by each dart is small, they can create a visual disturbance due to sunlight reflecting on their shiny aluminum skin. This degrades both the scenic value and the naturalness of the refuge wilderness, and should be considered a significant, long-term impact to wilderness character.

The only current program to deal with military debris on the refuge is notification of the military when unexploded ordnance is located on the refuge. This would continue under all of the action alternatives. Under Alternatives 3, 4 and 5, the refuge would work actively with the military and volunteers to remove tow darts and tow cable from the refuge wilderness. Alternative 3 also would establish a system of prioritizing tow darts for removal from the refuge wilderness. Alternative 5 would set a goal of removing a minimum of 15 tow darts per year from the refuge. Removing tow darts from wilderness would involve short-term impacts to wilderness character from the actual removal activity, but long-term enhancement of wilderness character by eliminating non-natural structures from the wilderness. The short-term impacts of removal activity would be mitigated under Alternatives 3, 4 and 5 by scheduling the activity at time when visitors use low and thus visitors are unlikely to encounter removal crews. Given mitigation, as well as consideration that the activity reduces a long-term wilderness impact, this activity should be considered a non-significant, short-term impact. Alternatives 3 or 4 would result in a long-term reduction of the number of tow darts in wilderness. Alternative 5 would result in a similar, but accelerated reduction.

4.3.2.2 Border Law Enforcement

Border Law Enforcement activities on the refuge include regular vehicle patrols along the non-wilderness access corridors, regular low altitude helicopter patrols, frequent vehicle travel on administrative trails and trackways created by UDAs and smugglers, patrols on all-terrain vehicles over migrant trails and

maintenance of two field camps along el Camino del Diablo. While the Arizona Desert Wilderness Act of 1990 includes specific provisions allowing activities of border law enforcement agencies, these activities severely affect wilderness values and wilderness character.

Use of vehicles and low level aircraft over flights seriously undermine the refuge wilderness's naturalness, and opportunities for solitude. The presence of field camps along el Camino del Diablo, although the camps' footprints are entirely within the non-wilderness corridor, degrades the undeveloped appearance of the nearby areas of wilderness. Border law enforcement activities may also impair the recreational value of the wilderness, as many recreational users surveyed expressed negative impressions of seeing and hearing CBP-BP operations. These cumulative impacts should be considered significant, long-term degradation of the refuge wilderness character and values.

In view of the foregoing, it is important to note that border law enforcement activity, while causing adverse consequences to wilderness, serves to reduce the illegal activity within the refuge wilderness. The Environmental Planning Group, an environmental consulting firm, was hired to analyze wilderness impacts of the proposed refuge management alternatives. In its Wilderness Impact Analysis Report, EPG, determined that impacts caused by border management – both law enforcement activities and use of the refuge wilderness by UDAs and smugglers – were the most significant and extensive impacts affecting the refuge and wilderness (2004).

Illegal use of the refuge by UDAs and smugglers causes multiple adverse consequences to refuge wilderness values and character. Some smugglers and UDAs illegally operate vehicles within refuge wilderness, leaving vehicle tracks that have created well defined, easily followed illegal roads in the eastern area of the refuge wilderness (see map, figure 4.1). Another result of illegal vehicle use is the accumulation of abandoned vehicles that break down or become stuck while crossing the refuge wilderness. Refuge staff report that between 20 and 25 vehicles remain in refuge wilderness at any time, despite continuing refuge efforts to remove vehicles as soon as they are identified (DiRosa 2004).

In addition to illegal vehicle use in wilderness, both UDAs and smugglers also travel on foot through the wilderness. The estimated volume of pedestrian traffic greatly exceeds the numbers of permitted refuge visitors (DiRosa 2004). This volume is exacerbated by the fact that illegal entrants to the refuge have different priorities than refuge visitors. Their situation dictates visiting wildlife waters for shelter and drinking water, as well as discarding any items no longer needed.

Direct consequences to wilderness resources from illegal traffic on the refuge include impairment of naturalness by the presence of abandoned vehicles, vehicle tracks, and litter. The wilderness's undeveloped character and scenic value are also directly degraded by the presence of this evidence of human use. The recreational value of the refuge wilderness is indirectly degraded by the presence of UDAs and smugglers and a perceived threat to visitor safety (Burkardt and Lybecker 2004).

Border law enforcement, while generating adverse impacts to wilderness, has the potential to mitigate the ongoing adverse effects of high-volume illegal cross border traffic.

Installation of a border vehicle barrier, currently being considered by DHS, would also reduce wilderness impacts caused by UDAs using vehicles. If a viable barrier is constructed in the future, it should result in long-term cumulative benefits to refuge wilderness.

While Alternatives 3 and 4 would include additional training materials and communication with border law enforcement personnel by the refuge, the ultimate wilderness impact associated with border law enforcement would not measurably change under the no action scenario or any of the four action alternatives.

4.3.2.3 Refuge Management

Refuge management also may affect wilderness character and wilderness values. Some changes in management regime are likely to affect a variety of wildlife populations. These effects are discussed in Section 4.2.3 above.

Alternative 1, No Action Scenario

Under present management, 27 developed wildlife waters are maintained in wilderness. The presence of these developments can be viewed as contrary to the undeveloped and untrammeled character of wilderness. Eighteen of these developed waters, however, were present and maintained on the refuge while the refuge wilderness proposal was being developed and the refuge was managed as "de facto wilderness." Additionally, the refuge periodically hauls water to 20 of the developed waters in wilderness, although fewer than 20 developed waters receive hauled supplemental water each year. Refuge staff estimates that during an average year they make 9 to 18 water hauling trips, a range of 240 to 485 kilometers (150 to 300 miles) driven on administrative trails in wilderness. During a year of extreme drought, refuge staff would make between 30 and 42 water hauling trips, a range of 800 to 1120 kilometers (500 to 695 miles) driven on administrative trails in wilderness. In addition to driving related to hauling supplemental water, refuge management includes some vehicle use in wilderness for monitoring wildlife and habitats and periodic maintenance of developed waters. These activities generally require driving less than 160 kilometers (100 miles) per year on refuge administrative trails. All vehicle use in wilderness for refuge management purposes is subject to a minimum requirements analysis to verify its necessity and appropriateness.

Vehicle use in wilderness for refuge management adversely affects the wilderness's natural character and its undeveloped character, to the extent that use of administrative trails maintains their status. The practice also has the potential to affect the scenic and recreational values of the wilderness, however this effect is limited. Refuge management vehicle use occurs almost entirely during the hot months of summer, when there is virtually no refuge visitation.

Under the no action scenario, the refuge would retain management vehicular use of 234 kilometers (145 miles) of administrative trails, subject to minimum requirements analysis.

Approximately 224 kilometers (139 miles) of vehicle trails used for management activities prior to wilderness designation but no longer used exist on the refuge wilderness. Refuge volunteers rehabilitate a limited amount of these trails, or new vehicle trails created by illegal travel on refuge, each year. This practice restores a natural appearance to the trails and discourages their continued, unauthorized use, positively influencing the natural and undeveloped character of the wilderness, as well as it scenic value. These activities would continue under all action alternatives.

The presence of developed waters in wilderness presents complex issues. Their presence should be considered a significant, long-term impact to the untrammeled and undeveloped character of the wilderness, but this is mitigated by the fact that they were developed and continue to be maintained in order to support conservation of an endangered species, the Sonoran pronghorn, and a wilderness dependent species, the desert bighorn sheep (Leopold 1933). While there is no definitive evidence that developed waters are absolutely necessary to the conservation of desert bighorn sheep, such waters are an accepted component of desert bighorn sheep conservation in Arizona. Conservation of these native species supports the naturalness of the refuge. Given this mitigating factor, the Service considers the presence of developed waters a direct, non-significant, long-term impact of refuge management.

The use of vehicles in wilderness to maintain and supply developed waters and execute some refuge monitoring activities is allowed under the minimum requirements provision of the Wilderness Act of 1964 (Section 4 [c]). Generic minimum requirements determinations for refuge management actions can be found at Appendix F (these will be supplemented with determinations specific to each actually proposed activity).

The significance of this use is limited by the timing of refuge vehicle use, which occurs during the summer season when visitors are largely absent. The overall use of vehicles under prevailing (no action scenario) management requires approximately 42 to 67 hours of driving in wilderness during an average year and approximately 96 to 128 hours during a year of extreme drought, using a conservative average speed of 10 kilometers per hour (6 miles per hour) for refuge driving. Refuge vehicles thus operate in wilderness a maximum of approximately 2 percent of the time (128 hours in an 8760 hour year equals 1.5 percent) under current management. As refuge vehicles only operate on existing administrative trails, they create no new soil compaction or tracks. The overall impact the current level of refuge vehicle use should thus be considered a non-significant, long-term direct effect of refuge management. Continued vehicle use of administrative trails can also be considered a direct long-term impact to the extent that this use keeps the trail surface compacted. The process of soil recovery from compaction in the Sonoran Desert is very slow however (wheel ruts from nineteenth century migrants are visible in places on the refuge) and unrestricted use of the administrative trails by border law enforcement vehicles greatly exceeds refuge management use.

Alternative 2

Implementing Alternative 2 would result in a considerable decrease in refuge management activities conducted in wilderness. Water hauling to 10 developed waters in desert bighorn sheep habitat would be discontinued and structural improvements at those developed waters would be removed. Only 15 developed waters in Sonoran pronghorn wilderness habitat would be supplied with water sufficient to keep them from running dry during normal conditions. During periods of severe drought, the refuge would haul supplemental water to the storage tanks at Jose Juan and Redtail Charcos. During an average year, refuge staff would make 11 water hauling trips, an estimated 128 kilometers (75 miles) of vehicle use on administrative trails in wilderness (average water hauling trips are shorter when hauling to desert bighorn sheep water is discontinued, as these waters tend to be more remote from non-wilderness access ways). During years of extreme drought staff would haul water three times to those developed waters plus three times to Redtail and Jose Juan Charcos, a total of 39 trips, or 455 kilometers (283 miles) of travel on administrative trails in wilderness. During the first year of implementation, this alternative would require one-time visits to each of the developed waters requiring removal of structures, for a total of 306 kilometers (190 miles) of travel on administrative trails in wilderness. This would be a one-time use, and would result in enhanced naturalness at the sites of the nine developed water where structures would be dismantled. Vehicle use in wilderness for monitoring or maintenance would be very limited under this alternative. Fewer than 15 kilometers (9 miles) of vehicle use on administrative trails in wilderness should occur annually for these purposes. Annual collection of water samples from developed waters, as proposed by this alternative, would be conducted on foot in wilderness.

The overall use of vehicles in wilderness for refuge management under Alternative 2 would be reduced considerably from the no action scenario. Implementing this alternative would require approximately 14 hours of driving in wilderness during an average year, approximately 47 hours during a year of extreme drought and approximately 43 hours of additional driving in refuge wilderness during the initial year of implementation, using a conservative average speed of 10 kilometers per hour (6 miles per hour) for refuge driving. The mitigating factors listed for the no action scenario (vehicles operated during the summer low-visitation period, vehicles operated only existing administrative trails and roads) would also apply to this alternative. The overall impact the level of refuge vehicle use that would be generated under Alternative 2 would thus range from approximately one sixth to one third of that generated under the no action scenario. This should be considered a non-significant, long-term direct effect of refuge management.

Under Alternative 2 the refuge would close refuge management use of approximately 97 kilometers (60 miles) of administrative trails in wilderness previously open to management vehicular use. This closure would restrict the trails' use by refuge staff to haul water or conduct other refuge management activities, but would not affect the ongoing use of such trails by border law enforcement personnel.

Alternative 2 would thus result in reduced short-term, recurring impacts to wilderness naturalness solitude

and scenic values through a reduction in the amount of refuge management vehicle use in wilderness, as compared to the no action scenario. If however, cessation of water hauling to desert bighorn sheep developed waters should result in extirpation of the refuge desert bighorn sheep population, this would be considered a reduction in the natural character and ecological value of wilderness by loss of a wilderness dependent wildlife species (Leopold 1933, Hendee and Dawson 2002). Removal of developed features in wilderness and closure of approximately 41 percent of the administrative trails in wilderness would result in a reduction in long-term impacts to wilderness naturalness and untrammeled character. The importance of the trail closure, however, would be lessened by continued use of the administrative trails by border law enforcement personnel.

Alternative 3

Implementing Alternative 3 would result in a decrease in refuge management activities conducted in wilderness as compared to the no action scenario. Only developed waters in Sonoran pronghorn wilderness habitat would be supplied with water sufficient to keep them from running dry during normal conditions. Structural improvements at the developed waters in desert bighorn sheep habitat would be removed. Only during years of extreme drought would water be hauled to developed waters in desert bighorn habitat. During an average year, refuge staff would make 11 water hauling trips, an estimated 128 kilometers (75 miles) of vehicle use on administrative trails in wilderness. During years of extreme drought staff would haul water to roughly the same extent as occurs during similar years under the no action scenario, or a range of 800 to 1120 kilometers (500 to 695 miles) driven on administrative trails in wilderness. As would be the case for Alternative 2, this alternative would require one-time visits to each of the developed waters requiring removal of structures, for a total of 306 kilometers (190 miles) of travel on administrative trails in wilderness during the initial year of implementation. This would be a one-time use, and would result in enhanced naturalness at the sites of the nine developed water where structures would be dismantled. Similar to Alternative 2, vehicle use in wilderness for monitoring or maintenance would be very limited under this alternative. Fewer than 15 kilometers (9 miles) of vehicle use on administrative trails in wilderness would occur annually for these purposes.

The overall use of vehicles in wilderness for refuge management under Alternative 3 during average rainfall years would be reduced considerably from the no action scenario. Implementing this alternative would require approximately 14 hours of driving in wilderness during an average year, approximately 81 to 114 hours during a year of extreme drought and approximately 31 hours of additional driving in refuge wilderness during the initial year of implementation, using a conservative average speed of 10 kilometers per hour (6 miles per hour) for refuge driving. The mitigating factors listed for the no action scenario (vehicles operated during the summer low-visitation period, vehicles operated only existing administrative trails and roads) would also apply to this alternative. The overall impact the level of refuge vehicle use that would be generated under Alternative 3 would thus range from approximately one quarter of to roughly equivalent to that generated under the no action scenario. This should be considered a non-significant, long-term direct effect of refuge management.

Under Alternative 3 the refuge would close refuge management of approximately 32 kilometers (20 miles) of administrative trails in wilderness previously open to management vehicular use. This closure would restrict the trails' use by refuge staff to haul water or conduct other refuge management activities, but would not affect the ongoing use of such trails by border law enforcement personnel.

Alternative 3 would thus result in reduced short-term, recurring impacts to wilderness naturalness solitude and scenic values through a reduction in the amount of refuge management vehicle use in wilderness, as compared to the no action scenario. If however, cessation of water hauling to desert bighorn sheep developed waters should result in extirpation of the refuge desert bighorn sheep population, this would be considered a reduction in the natural character and ecological value of wilderness by loss of a wilderness dependent wildlife species (Leopold 1933, Hendee and Dawson 2002). Removal of developed features in wilderness and closure of approximately 14 percent of the administrative trails in wilderness would result in

a reduction in long-term impacts to wilderness naturalness and untrammeled character. The importance of the trail closure, however, would be lessened by continued use of the administrative trails by border law enforcement personnel.

Alternative 4 (Preferred alternative)

Under this alternative, the refuge initially would continue to haul supplemental water to all developed waters as described for the no action scenario. Over time, however, the refuge would initiate a program of upgrading developed waters to reduce their need for supplemental water maintenance as well as creating a more natural appearance. Prior to these upgrades, water hauling under this alternative would be similar to what occurs under the no action scenario. That would be a range of 240 to 485 kilometers (150 to 300 miles) driven on administrative trails in wilderness in average years and a range of 800 to 1120 kilometers (500 to 695 miles) driven on administrative trails in wilderness during drought years. In addition to driving related to hauling supplemental water, refuge management would include some vehicle use in wilderness for monitoring wildlife and habitats and periodic maintenance of developed waters. These activities should require driving fewer than 160 kilometers (100 miles) per year on refuge administrative trails. Annual collection of water samples from all developed waters, as proposed in this alternative would either be done in conjunction with water hauling visits or on foot in wilderness.

Redevelopment of the waters would require construction activity in wilderness. Refuge staff would mitigate these impacts by scheduling construction at times when visitor use is low, assembling as many components outside of wilderness as possible and delivering components of the waters to the site by truck (see Appendix F, Action 13 for a discussion of the decision to use a truck). Completion of the developed water upgrades should reduce the necessity of vehicle use on administrative trails in wilderness, both for water hauling and for maintenance of the waters. Experience in similar environments suggests that upgraded waters should not require supplemental water or maintenance other than during prolonged, extreme drought.

Under Alternative 4 the refuge would close refuge management of approximately 32 kilometers (20 miles) of administrative trails in wilderness previously open to management vehicular use. This closure would restrict the trails' use by refuge staff to haul water or conduct other refuge management activities, but would not affect the ongoing use of such trails by border law enforcement personnel.

The initial consequences to wilderness resources of implementing the refuge management activities proposed under this alternative would be very similar to those of the no action scenario (42 to 67 hours of management vehicle operation in wilderness during a typical year and 96 to 128 hours of such use during a year of extreme drought), with the exception that approximately 14 percent of the administrative trails network would be closed to refuge management vehicular use. This closure would not affect border law enforcement use of the administrative trails. The proposed upgrades to developed waters on would create additional temporary impacts to the natural character, undeveloped character and solitude of the wilderness during installation of the upgrades. These improvements, however, should lead to a long-term decrease in refuge vehicle use and result in more natural appearing developed waters. The potential construction of additional developed waters for desert bighorn sheep, however, would add to this alternative's adverse impacts upon the natural, undeveloped and untrammeled character of the wilderness. The overall result would be an increase in the wilderness's scenic value, natural character and solitude, although developed waters would remain in wilderness.

Alternative 5

Under this alternative, the refuge initially would continue to haul supplemental water to all developed waters as described for the no action scenario. Over time, however, the refuge would initiate a program to upgrade developed waters as described above for Alternative 4. Additionally, should research suggest that additional waters would benefit desert bighorn sheep and Sonoran pronghorn, the refuge will locate sites for additional new developed waters of the upgraded design. Prior to these upgrades, water hauling under this

alternative would be similar to what occurs under the no action scenario. That would be a range of 240 to 485 kilometers (150 to 300 miles) driven on administrative trails in wilderness in average years and a range of 800 to 1120 kilometers (500 to 695 miles) driven on administrative trails in wilderness during drought years. In addition to driving related to hauling supplemental water, refuge management would include some vehicle use in wilderness for monitoring wildlife and habitats, periodic maintenance of developed waters and collection of water samples from developed waters. These activities should require driving approximately 465 kilometers (290 miles) per year on refuge administrative trails.

Redevelopment of the waters would require construction activity in wilderness. Refuge staff would mitigate these impacts by scheduling construction at times when visitor use is low, assembling as many components outside of wilderness as possible and delivering components of the waters to the site by truck (see Appendix F, Action 13 for a discussion of the decision to use a truck). Completion of the developed water upgrades should reduce the necessity of vehicle use on administrative trails in wilderness due to reduced maintenance and supplemental water requirements of such waters.

The proposal to develop forage enhancemenst in desert bighorn sheep habitat under this proposal would require creation of small earthen beams or other structures to redirect runoff. While such structures can likely be blended fashioned of natural materials and blended into the landscape, they are unnatural manipulation of the environment. Thus they adversely affect the natural, undeveloped and untrammeled character of the wilderness.

The entire administrative trails network would remain available for refuge management vehicular use under this alternative.

The initial consequences to wilderness resources of implementing the refuge management components of this alternative would be very similar to those of no action scenario, with a slight increase in total management vehicle use in wilderness due to increased management activities not related to water hauling. Initial total refuge management vehicle travel in wilderness would be 10 to 95 hours during a typical year and 126 to 158 hours during a drought year, assuming an average speed of 10 kilometers per hour (6 miles per hour). Construction of additional developed waters and a forage enhancement for desert bighorn sheep, however, would add to this alternative's adverse impacts upon the natural, undeveloped and untrammeled character of the wilderness. The net effect of implementing Alternative 5 would be direct, long-term adverse effects to wilderness naturalness, undeveloped character and untrammeled character greater than those of any other preferred alternative.

4.3.2.4 Public Use

Much wilderness management research has focused on the effects of recreational public use, as public use is often perceived by managers has the single greatest human influence on wilderness (Hendee *et al.* 1990). At Cabeza Prieta, however, overall visitation is low, and the fraction of visitors actually entering wilderness is a small subset of overall visitation (R. DiRosa, USFWS, pers. comm.).

Alternative 1, No Action Scenario

Under current management, all refuge visitors are required to obtain a permit prior to entering the refuge. Campfires are restricted to charcoal or fuel stoves, to limit over harvesting of the limited woody vegetation for firewood. All visitors registering for an entry permit are provided information about the hazards of backcountry travel in the desert wilderness and refuge rules and regulations. Visitors desiring to use pack or saddle stock must obtain a special use permit, as must visitors desiring to camp longer than 14 consecutive days. Camping within 400 meters (1/4 mile) of a wildlife waterhole is prohibited.

Visitor days increased from just over 2,000 at the beginning of the decade of the 1990s to just over 5,000 in 1999. Maximum visitor days reached 3000 per month in March of 1998, but in an average year such as 1997,

maximum visitor days hover short of 900 per month for approximately 5 months. This would average out to approximately 30 people present each day on the refuge during the peak season. This is very light visitation, as compared with other National Wildlife Refuges. Of this light visitation, only a small fraction, estimated to be approximately 5 percent of overall visitation (R. DiRosa, USFWS pers. comm.), travel on foot far beyond the non-wilderness public access corridors.

It is not always possible to distinguish between adverse impacts to wilderness, such as off-road vehicle tracks and litter, caused by legitimate visitors and those caused by illegal traffic. The low number of visitors and their access to information about prohibited and appropriate activities in wilderness suggest that legitimate visitors to the refuge cause little adverse impact to refuge wilderness resources.

Overall direct impacts to wilderness resources caused by refuge visitors under current management are generally limited to short-term disruption of solitude when two groups encounter one another, or from vehicle presence and noise near the non-wilderness public access corridors. Due to the very low level of visitation, however the total impact from visitors is negligible when compared to that caused by illegal travelers, border law enforcement and military over flights.

Alternatives 2 and 3

Under these alternatives visitation would be anticipated to decrease slightly below that of the no action scenario. No additional impacts to wilderness should result. Under these alternatives the maximum length of stay without a special use permit would be seven consecutive days and party size would be limited to eight persons. These restrictions are place to limit the impacts of wilderness camping. Should visitation increase dramatically in the future these restrictions would mitigate the resource damage caused by wilderness visitors.

Alternative 4 (Preferred alternative)

Under this Alternative visitation to the refuge is anticipated to increase slightly above that of the no action scenario. Allowing use of wood fires in the designated camping areas with wood not native to the Sonoran Desert is not anticipated to damage refuge resources. The refuge will continue to monitor the wilderness resource and respond to any adverse impacts. No measurable increase in adverse impacts to wilderness above those caused by the no action scenario should result from implementing this alternative. Under this alternative the maximum length of stay for camper would remain 14 consecutive days and camping party size would be limited to eight persons. Should visitation increase dramatically in the future these restrictions would mitigate the resource damage caused by wilderness visitors. Allowing street-legal ATVs and motorcycles on the refuge might increase visitation, but any such increase would likely be very small.

Alternative 5

Implementing this alternative would result in a long-term increase in refuge visitation. Additional hunting opportunities and reduced restrictions on visitor behavior could result increased numbers of visitors and greater use of pack and saddle stock. Relaxed restrictions on campfires and vehicle types allowed on the public access corridors could result in adverse impacts to the solitude of the wilderness. These impacts, however, are anticipated to be small in comparison to those caused by illegal cross-border traffic and the necessary border law enforcement response. Additionally, the development of additional campsites and other recreational amenities outside of refuge wilderness should redirect visitation away from wilderness, thus mitigating wilderness impacts from increased visitation. Should visitation increase dramatically in the future, however, unrestricted party size, unrestricted use of pack and saddle stock and relaxed control of fire and vehicle use could result in greater impacts to wilderness naturalness and solitude.

4.4 CHILDS MOUNTAIN COMMUNICATIONS SITE

The FAA, the Air Force and several commercial users lease space on this site on the summit for Childs Mountain for placement of radar and communications equipment that benefits from the mountain's high relief. While the site is outside of wilderness, the communications and radar facilities are highly visible from within wilderness. Some stakeholders have called for their removal.

Alternative 1, No Action Scenario

The facilities on Childs Mountain are operated under a memorandum of understanding between the Air Force, FAA and the Service. Upon expiration of this MOU in 2018, all facilities are required to be removed from the summit. During the duration of the MOU, the refuge considers requests for additional facilities on site based upon their footprint. Equipment that can be installed on existing towers or existing equipment pads, such as antennas, is generally permitted. Facilities that would require new ground disturbance are generally not permitted. Under the no action scenario the visual impact of the communications site will remain until 2018, when it will be removed.

Alternatives 2 and 3

Under these alternatives no new equipment would be added to the site. All facilities would be removed at the expiration of the current MOU. The effects of these alternatives would very similar to those of the no action scenario; visual impact from existing facilities until their removal in 2018.

Alternatives 4 (Preferred alternative) and 5

Under these alternatives the refuge would continue to review requests for new equipment as described above for the no action scenario. Additionally, the refuge would consider extending the duration of the MOU beyond 2018, if communication facilities are still necessary for protection of life and law enforcement. The refuge would encourage the lessees of the site to identify and remove any obsolete buildings or equipment. The effects of these alternatives are similar to those of the no action scenario, except that they may be of longer duration.

4.5 CULTURAL RESOURCES

Refuge cultural resources include petroglyphs, other prehistoric artifacts, migrant graves, ruts of the historic el Camino del Diablo and artifacts related to the early history of Ajo on the visitor center site.

Alternative 1, No Action Scenario

Currently refuge cultural resources are protected through avoidance of disturbance. Prior to any projects requiring earth moving, an archaeological review is be completed to ensure that cultural resources are not affected. Unauthorized excavation or disturbance of cultural or historical artifacts is prohibited. The location of known cultural artifacts on the refuge is not published or otherwise publicly disclosed. The only interpretation of cultural artifacts at the refuge occurs out of context at the visitor center. This approach to cultural resource protection generally prevents disturbance of resources, but does not identify damage occurring through natural processes such as erosion or due to illegal activities on the refuge.

Alternatives 2 and 3

Under these alternatives, the cultural resources management of the no action scenario would continue. No change in consequences to cultural resources would result.

Alternatives 4 (Preferred alternative) and 5

Under these alternatives, the cultural resources management of the no action scenario would continue with the following enhancements. An old trash dump located on the visitor center site would be interpreted with placards interpreting the early history of Ajo. Refuge staff would regularly inspect known cultural resource sites to identify damage from natural processes or illegal activity. The refuge would develop and implement stabilization measures, as necessary. The refuge would develop and offer training in cultural resources protection for border law enforcement personnel.

The measures proposed for implementation under these alternatives would provide visitors with a greater appreciation of the early history of Ajo and should afford refuge cultural resources with greater protection than under the no action scenario.

4.6 SOCIOECONOMIC RESOURCES

4.6.1 Economic Consequences

The economic consequences of a national wildlife refuge to the surrounding area are generated by two sources, refuge operations and expenditures in the local economy by refuge visitors. Refuge operations include employment of refuge staff and purchases of equipment and supplies. Because of the way industries interact in an economy, a change in the activity of one industry affects activity levels in several other industries. For example, an increase in funding could allow the Refuge to start new projects or hire additional staff members. This added revenue will directly flow to the businesses from which the Refuge purchases goods and services and to the new Refuge employees. As additional supplies are purchased or as new staff members spend their salaries within the community, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from Refuge purchases and Refuge employees' spending of salaries locally represents the *direct* effects of Refuge management activities within Ajo. In order to increase supplies to local businesses, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the *indirect* effects of Refuge management activities within the county. The input supplier's new employees use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the *induced* effect of visitor spending. The sums of the direct, indirect and induced effects describe the total economic effect of Refuge management activities in Ajo.

Any effect on the local economy that would alter the overall economy by 3 percent or more, in terms of overall expenditures, income or employment, is considered significant. Changes below this level are within the level of normal variation in the business cycle.

4.6.1.1 Refuge Operations

Alternative 1, No Action Scenario

The refuge currently employs 12 full time staff, with total salary for 2004 estimated at $547,805. All of the employees live within the local area. As described in the Regional Economics Effects report prepared by USGS and attached to this EIS as Appendix L, refuge employment results in additional indirect and induced effects in the local economy of Ajo, Arizona, estimated at $96,264 income per year and the 3.5 jobs. The total impact of refuge employment equals the sum salary income plus the sum of indirect income, or $644,069 income per year and 15.5 jobs. Additionally, the refuge purchases goods and services. The estimated value of these purchases for 2004 is $415,200, with approximately 15 percent, or $62,280 being spent in the local area, the total influence of local spending is lower, however as some of the total goes toward non-local inventory. Refuge non-salary expenditures result in direct effects such as employment in the retail and auto repair sectors as well as indirect and induced effects. Direct effects of nonsalary expenditures are estimated at $27,924 income per year and 1.0 job. Indirect and induced effects of nonsalary expenditures are estimated at $11,511 and 0.4 job. The total of direct and indirect or induced effects of refuge nonsalary expenditures is estimated as $39,435 income per year and 1.4 jobs. Total refuge staffing and budgeting impacts to the local economy, as estimated by USGS, are thus $644,069 income per year and 15.5 jobs, or 0.88 percent of the local annual income total and approximately 1.19 percent of the local job base. These should be considered long-term, non-significant benefits to the local economy.

Alternative 2

Under Alternative 2, nonsalary expenditures would be decreased by 10 percent as compared with the no action scenario due to considerable reductions of refuge maintenance in the field. Salary expenditure would increase, however, due to the addition of one position to facilitate keeping the refuge visitor center open additional hours. This increase is reflected as a fraction of a job due to the lower than average salary of the

position that would be created. Anticipated effects of refuge salary expenditures for this alternative would be direct effects estimated at $569,293 income per year and 12.6 jobs and indirect effects of $100,071 income per year and 3.6 jobs. Nonsalary impacts of implementing this alternative would be an estimated direct effect of $25,132 income per year and 0.9 job and indirect or induced effects of $10,359 income per year and 0.3 job. The total economic effect on Ajo, Arizona, anticipated from implementing this alternative would be $704,855 income per year, and 17.4 jobs, or 0.91 percent of local annual income and 1.22 percent of the local job base. The long-term effect of implementing this alternative would be a slight decrease in the refuge's long-term contribution to the local economy as compared to the no action scenario, but the effects would be very small in the context of the overall economy and not significant.

Alternative 3

Under Alternative 3, nonsalary expenditures would be increased by 10 percent as compared with the no action scenario to fund the additional sheep monitoring proposed. Salary expenditure would increase, due to the addition of two positions to facilitate additional refuge management and monitoring activities. This increase is reflected as a slightly less than two jobs due to the lower than average salaries of the positions that would be created. Anticipated effects of refuge salary expenditures for this alternative would be direct effects estimated at $626,598 income per year and 13.8 jobs and indirect effects of $110,114 income per year and 4.0 jobs. Nonsalary impacts of implementing this alternative would be an estimated direct effect of $30,716 income per year and 1.1 jobs and indirect or induced effects of $12,662 income per year and 0.4 job. The total economic effect on Ajo, Arizona, anticipated from implementing this alternative would be $780,120 income per year, and 19.3 jobs, or 1.00 percent of local annual income and 1.36 percent of the local job base. Overall, the long-term economic impact of implementing this alternative would be a small increase local refuge spending, employment and income, as compared to the no action scenario. The increase would be very small, however, and is not significant.

Alternative 4 (Preferred alternative)

Under Alternative 4, nonsalary expenditures would be increased by 25 percent as compared with the no action scenario to fund construction of improved water catchments and small increases in monitoring proposed. Salary expenditure would increase to reflect the addition of three positions, a wildlife biologist, a maintenance worker and a law enforcement officer. This increase is reflected as a somewhat less than three jobs due to the lower than average salaries of the positions that would be created. Anticipated effects of refuge salary expenditures for this alternative would be direct effects estimated at $658,433 income per year and 14.5 jobs and indirect effects of $115,740 income per year and 4.2 jobs. Nonsalary impacts of implementing this alternative would be an estimated direct effect of $34,905 income per year and 1.3 jobs and indirect or induced effects of $14,388 income per year and 0.5 job. The total economic effect on Ajo, Arizona, anticipated from implementing this alternative would be $823,466 income per year, and 20.5 jobs, or 1.06 percent of local annual income and 1.44 percent of the local job base. As in the case of Alternative 3, the long-term economic impact of implementing this alternative would be a small increase local refuge spending, employment and income, as compared to the no action scenario. The increase would be very small, however, and is not significant.

Alternative 5

Under Alternative 5, nonsalary expenditures would double as compared with the no action scenario to fund construction of improved water catchments, development of the Copper Canyon Road Loop, and the considerable increases in monitoring proposed. Salary expenditure would increase to reflect the addition of five positions, two wildlife biologists, a maintenance worker, a law enforcement officer and an outdoor recreation planner. This increase is reflected as a slightly less than five jobs due to the lower than average salaries of the positions that would be created. Anticipated effects of refuge salary expenditures for this alternative would be direct effects estimated at $722,104 income per year and 15.9 jobs and indirect effects of $126,932 income per year and 4.6 jobs. Nonsalary impacts of implementing this alternative would be

estimated direct effects of $55,848 income per year and 2.1 jobs and indirect or induced effects of $23,021 income per year and 0.7 job. The total economic effect on Ajo, Arizona, anticipated from implementing this alternative would be $927,905 income per year, and 23.3 jobs, or 1.19 percent of local annual income and 1.64 percent of the local job base. Overall, the long-term economic impact of implementing this alternative would be a greater increase in local refuge spending, employment and income of any proposed management alternative. The increase would be very small, however, and is not significant.

Summary

The local economic effects of the no action scenario and four action alternatives are summarized in table 4.1.

Table 4.1: Summary of Refuge staffing and budgeting economic impacts

Ajo Economy	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total Refuge Staffing and Budgeting Impacts					
(salary and non-salary)					
Direct Effects					
Income ($/year)	$575,729	$594,425	$657,314	$693,338	$777,952
Jobs	13.0	13.5	14.9	15.8	18.0
Indirect and Induced Effects *(in Ajo Economy)*					
Income ($/year)	$107,775	$110,430	$122,806	$130,128	$149,953
Jobs	3.9	3.9	4.4	4.7	5.3
Total Effects					
Income ($/year)	**$683,504**	**$704,855**	**$780,120**	**$823,466**	**$927,905**
Jobs	**16.9**	**17.4**	**19.3**	**20.5**	**23.3**
% of Total Ajo Income	*0.88%*	*0.91%*	*1.00%*	*1.06%*	*1.19%*
% of Total Ajo Employment	*1.19%*	*1.22%*	*1.36%*	*1.44%*	*1.64%*

4.6.1.2 Visitor Expenditures

The refuge offers a variety of recreational, interpretive and educational opportunities that draw visitors. Total visitation under of each of the management alternatives was estimated by extrapolating recent visitor trends and correcting for visitor opportunities offered under each alternative. Using visitation projections developed by refuge, USGS determined the economic impacts of visitor spending from the following equation:

Number of refuge visitors x average spending x regional multiplier = Economic Impact

For the purposes of this analysis, refuge visitation projections were used as the number of refuge visitors. Results from the 2002 visitor survey (Burkardt and Lybecker 2004) on visitor spending provide the average spending per visitor day. The IMPLAN modeling system was used to derive the multipliers that capture the secondary (indirect and induced) effects needed to determine the economic impacts of visitor spending (Caughlan 2004). Brief visits to the visitor center not associated with a visit to the refuge beyond the visitor center site were not included in the economic analysis, as such visits were viewed as opportunistic brief stops by individuals passing though Ajo.

The USGS analyzed economic effects of visitor spending on statewide and local levels (Caughlan 2004). As there was no measurable difference among the statewide effects of refuge visitor spending among the management alternatives, and as that effect represented 0.0001 percent of total state income, the effects of visitor spending on the State of Arizona are not presented here. This analysis appears in Appendix L.

The impacts projected for the no action scenario and each preferred alternative are presented below. In every case the overall direct and indirect benefits to local economy would be too small to be significant, and would have no noticeable effect on the local economy.

Alternative 1, No Action Scenario

Under the no action scenario refuge visitation was estimated at 8,046 visitor days, distributed as 7,806 general recreational visitor days and 240 desert bighorn sheep hunting visitor days. The direct local economic effects of visitation derived by USGS for this alternative are $38,547 income per year and 1.7 jobs created. Indirect and induced local effects are $16,686 income per year and 0.5 job created. The total local economic effects of current management are estimated to be $55,233 income per year and 2.2 jobs created, or 0.07 percent of local income and 0.15 percent of local employment.

Alternative 2

Under this alternative refuge visitation would be estimated at 7,771 visitor days, all of which would be general recreational visits, as no hunting would be allowed. The direct local economic effects of visitation derived by USGS for this alternative are $38,372 income per year and 1.6 jobs created. Indirect and induced local effects are $16,611 income per year and 0.5 job created. The total local economic effects of current management are estimated to be $54,983 income per year and 2.1 jobs created, or 0.07 percent of local income and 0.15 percent of local employment.

Alternative 3

Under this alternative refuge visitation would be estimated at 7,934 visitor days, distributed among 7,771 general recreation visitor days and 163 hunter visitor days. The direct local economic effects of visitation derived by USGS for this alternative are $38,372 income per year and 1.6 jobs created. Indirect and induced local effects are $16,611 income per year and 0.5 job created. The total local economic effects of current

management are estimated to be $54,983 income per year and 2.1 jobs created, or 0.07 percent of local income and 0.15 percent of local employment.

Alternative 4 (Preferred alternative)

Under this alternative refuge visitation would be estimated at 8,496 visitor days, distributed among 8,231 general recreation visitor days and 265 hunter visitor days (the increase in hunter visitor days would only occur if the proposed additional hunts were implemented). The direct local economic effects of visitation derived by USGS for this alternative are $40,640 income per year and 1.7 jobs created. Indirect and induced local effects are $17,593 income per year and 0.5 job created. The total local economic effects of current management are estimated to be $58,233 income per year and 2.2 jobs created, or 0.07 percent of local income and 0.15 percent of local employment.

Alternative 5

Under this alternative refuge visitation would be estimated at 8,921 visitor days, distributed among 8,656 general recreation visitor days and 265 hunter visitor days (the increase in hunter visitor days would only occur if the proposed additional hunts were implemented). The direct local economic effects of visitation derived by USGS for this alternative are $42,741 income per year and 1.8 jobs created. Indirect and induced local effects are $18,502 income per year and 0.6 job created. The total local economic effects of current management are estimated to be $61,243 income per year and 2.4 jobs created, or 0.08 percent of local income and 0.16 percent of local employment.

Summary

Table 4.2 provides a summary of the local economic effects of refuge visitor spending. Overall differences in total effects are small among the alternatives, the greatest difference between the no action scenario and one of the action alternatives being an approximate 11 percent overall increase in annual income effect from Alternative 1 to Alternative 5. This effect is so small a component of the overall local economy as not to be noticeable.

Table 4.2: Summary of economic effects of refuge visitor spending

Ajo Economy	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Direct Effects					
Income ($/year)	$38,547	$38,372	$38,372	$40,640	$42,741
Jobs	1.7	1.6	1.6	1.7	1.8
Indirect and Induced Effects					
Income ($/year)	$16,686	$16,611	$16,611	$17,593	$18,502
Jobs	0.5	0.5	0.5	0.5	0.6
Total Effects					
Income ($/year)	**$55,233**	**$54,983**	**$54,983**	**$58,233**	**$61,243**
Jobs	**2.2**	**2.1**	**2.1**	**2.2**	**2.4**
% Total Ajo Income	*0.07%*	*0.07%*	*0.07%*	*0.07%*	*0.08%*
% Total Ajo Employment	*0.15%*	*0.15%*	*0.15%*	*0.15%*	*0.17%*

4.6.2 Social Consequences

Analyzing the social consequences of management actions on the refuge is complicated by the diversity of values among refuge stakeholders. Also complicating discussion of social values is the dichotomy between recreational values accruing to visitors, such as scenic value and solitude, and existence values accruing to individuals who may never visit the refuge, but nonetheless care that wilderness, endangered species habitats or other refuge resources are protected. The USGS social impact analysis for Cabeza Prieta NWR (Burkardt and Lybecker 2004), attached as Appendix K, considered both responses to survey of individuals who visited the refuge in 2001 and broader national opinion trends regarding refuges, wilderness, hunting, endangered species and other issues germane to the refuge. In many cases a proposed management action could be expected to elicit a negative response from some individuals and a positive response from others. Some visitors viewed developed waters as an intrusion on the refuge's wildness, while others valued developed waters highly and mentioned viewing a developed water as a high point of their visit to the refuge (Burkardt and Lybecker 2004).

Some general trends were apparent in the survey. Respondents highly valued the solitude and scenery of the refuge and felt that the presence of illegal traffic and military over flights detracted from both. Some respondents complained that the activities of border law enforcement personnel adversely affected their refuge visit, while other praised the high level law enforcement activity to address degradation of the refuge

by illegal traffic. Military flight training over the refuge, border law enforcement and illegal traffic through the refuge are beyond the control of refuge management, and are likely to remain largely unchanged, regardless of the management alternative implemented.

As the ultimate social consequences on refuge management actions are largely dependent on the individual's or group's values, each action has a variety of positive and negative social consequences. These are described for each alternative in the USGS report; only general consequences are summarized here. Implementing Alternatives 2 or 3 would positively affect individuals and groups who value limiting management actions in wilderness and adversely affect individuals and groups who value interventions to manage wildlife populations. The cessation of water hauling to desert bighorn sheep developed waters proposed in Alternative 2 or the reduction of such hauling proposed in Alternative 3 would adversely affect UDAs who depend upon those waters while traversing the refuge. Continued active management of habitat resources in wilderness, as proposed in Alternatives 4 (Preferred alternative) and 5, would adversely affect individuals and groups who value limiting management actions in wilderness and favorably affect groups who value increasing wildlife populations through active management.

4.7 ENVIRONMENTAL JUSTICE

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or a socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. Meaningful involvement means that: (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision making process; and (4) the decision makers seek out and facilitate the involvement of those potentially affected (EPA 2004). No proposed action of any management alternative for the refuge should cause any group of people to bear a disproportionate share of negative environmental consequences. The refuge and the Service have sought meaningful involvement of all interested people through the scoping and other public involvement processes for this EIS, as described in Chapter 1.

4.8 SUMMARY OF CUMULATIVE IMPACTS OF PLAN ACTIONS AND OTHER, REASONABLY FORESEEABLE RELATED ACTIVITIES

Table 4.3: Cumulative Impacts

Resource Affected	Agent of Impact	Remarks	Reference
Soil surface	On-road vehicle use by Border Law Enforcement	Significant Impacts likely to continue under all management alternatives DHS construction of a vehicle barrier on or near the border would significantly mitigate soil disturbance from off-road driving	Page 182
Wilderness Character	UDAs, Border Law Enforcement vehicles and helicopter response, military overflights	Significant impacts to wilderness solitude, naturalness and undeveloped appearance likely to continue to under all management alternatives	Page 209
Endangered Species, Sonoran Pronghorn	Disturbance from UDAs (afoot and in vehicles) Border Law Enforcement vehicles, low altitude aircraft use (both military jets and helicopters, CBP-BP helicopters)	Potentially significant impacts to this rare species are ongoing and are likely to continue under any management alternative. DHS construction of a vehicle barrier on or near the border would significantly mitigate disturbance from off-road driving	Page 195

Appendix A: Legal, Policy and Administrative Guidelines and Other Special Considerations

Administration of national wildlife refuges is governed by bills passed by the United States Congress and signed into law by the President of the United States, and by regulations promulgated by the various branches of the government. Following is a brief description of some of the most pertinent laws and statutes establishing legal parameters and policy direction for the National Wildlife Refuge System, other than those described above in Section 1.6. of the EIS text:

Acts of Congress:

Fish and Wildlife Conservation Act of 1980 (Public Law 96-366, September 29, 1980, 16 U.S.C. §§ 2901-2911, as amended 1986, 1988, 1990 and 1992)

Created a mechanism for federal matching funding of the development of state conservation plans for non-game fish and wildlife. Subsequent amendments to this law require that the Secretary monitor and assess migratory nongame birds, determine the effects of environmental changes and human activities, identify birds likely to be candidates for endangered species listing, and identify conservation actions that would prevent this from being necessary. In 1989, Congress also directed the Secretary to identify lands and waters in the Western Hemisphere, the protection, management or acquisition of which would foster conservation of migratory nongame birds. All of these activities are intended to assist the Secretary in fulfilling the Secretary's responsibilities under the Migratory Bird Treaty Act and the Migratory Bird Conservation Act, and provisions of the Endangered Species Act implementing the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere.

Refuge Revenue Sharing Act of 1978 (Public Law 95-469, October 17, 1978, [amended 16 U.S.C. 715s]; 50 CFR, part 34).

Changed the provisions for sharing revenues with counties in a number of ways. It makes revenue sharing applicable to all lands administered by the Service, whereas previously it was applicable only to areas in the National Wildlife Refuge System. The new law makes payments available for any governmental purpose, whereas the old law restricted the use of payments to roads and schools. For lands acquired in fee simple, the new law provides a payment of 75 cents per acre, 3/4 of 1 percent of fair market value or 25 percent of net receipts, whichever is greatest, whereas the old law provided a payment of 3/4 of 1 percent adjustment cost or 25 percent of net receipts, whichever was greater. The new law makes reserve (public domain) lands entitlement lands under Public Law 94- 565 (16 U.S.C. 1601-1607), and provides for a payment of 25 percent of net receipts.

The new law authorizes appropriations to make up any shortfall in net receipts, to make payments in the full amount for which counties are eligible. The old law provided that if net receipts were insufficient to make full payment, payment to each county would be reduced proportionately.

Refuge Recreation Act of 1962 (Public Law 87-714; 76 Stat. 653-654; 16 U.S.C. 460k et seq.).

Authorizes appropriate, incidental, or secondary recreational use on conservation areas administered by the Secretary of the Interior for fish and wildlife purposes.

The National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347).

Declares national policy to encourage a productive and enjoyable harmony between humans and their environment. Section 102 of that Act directs that "to the fullest extent possible:

(i) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and
(ii) all agencies of the Federal Government shall . . . insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations. . . ."

Section 102(2)c of NEPA requires all federal agencies, with respect to major federal actions significantly affecting the quality of the human environment, to submit to the Council on Environmental Quality a detailed statement of:

1. the environmental impact of the proposed action;

2. any adverse environmental effect which cannot be avoided should the proposal be implemented;

3. alternatives to the proposed action;

4. the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity; and

5. any irreversible and irretrievable commitments of resources which would be involved in the proposed action, should it be implemented.

National Historic Preservation Act of 1966 (16 U.S.C. 470- 470b, 470c-470n, 80 Stat. 915), as amended.

Provides for preservation of significant historical features (buildings, objects, etc.) through a grant-in-aid program to the states. Establishes a National Register of Historic Places. Federal agencies are required to take into account effects of their actions on buildings, etc., included or eligible for inclusion on the National Register.

Fish and Wildlife Act of 1956 (70 Stat. 1119; 16 U.S.C. 742a- 742J), as amended.

Establishes a comprehensive fish and wildlife policy and directs the Secretary of the Interior to provide continuing research; extension and information service; and directed development, management, and conservation of fish and wildlife resources.

Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41. Stat 686) -- Section 41 of the Criminal Code, title 18.

Consolidates the penalty provisions of various acts from January 24, 1905 (16 U.S.C. 684-687; 33 Stat. 614), through March 10, 1934 (16 U.S.C. 694-694b; 48 Stat. 400) and restates the intent of Congress to protect all wildlife within federal sanctuaries, refuges, fish hatcheries and breeding grounds. The Act provides that anyone (except in compliance with rules and regulations promulgated by authority of law) who hunts, traps or willfully disturbs any wildlife on such areas, or willfully injures, molests or destroys any property of the United States on such lands or waters, shall be fined, imprisoned, or both.

Criminal Code of Provisions of 1940 as amended, (18 U.S.C. 41).

States the intent of Congress to protect all wildlife within federal sanctuaries, refuges, fish hatcheries, and breeding grounds. Provides that anyone (except in compliance with rules and regulations promulgated by authority of law) who hunts, traps, or willfully disturbs any such wildlife, or willfully injures, molests, or destroys any property of the United States on such land or water, shall be fined up to $500 or imprisoned for not more than 6 months or both.

Bald Eagle Act of 1940 (16 U.S.C. 668-668d; 54 Stat. 250; 50 CFR Subchapter), as amended.

Provides for protection of the bald eagle (the national emblem) and the golden eagle.

Refuge Trespass Act of June 28, 1906 (18 U.S.C. 41; 43 Stat. 98, 18 U.S.C. 145).

Provided first federal protection for wildlife on national wildlife refuges. This Act made it unlawful to hunt, trap, capture, willfully disturb, or kill any bird or wild animal, or take or destroy the eggs of any such birds, on any lands of the United States set apart or reserved as refuges or breeding grounds for such birds or animals by any law, proclamation, or executive order, except under rules and regulations of the Secretary. The Act also protects government property on such lands.

Regulations:

National Wildlife Refuge Regulations for the most recent fiscal year (50 CFR 25-35, 43 CFR 3103.2 and 3120.3-3).

Provides regulations for administration and management of national wildlife refuges including mineral leasing, exploration, and development.

Rights-of-Way General Regulations (50 CFR 29.21; 34 FR 19907, December 19, 1969).

Provides for procedures for filing applications. Provides terms and conditions under which rights-of- way over, above, and across lands administered by the Service may be granted.

Use of Off-Road Vehicles on Public Lands (Executive Order 11644, Federal Reg. Vol. 37, No. 27, February 9, 1972).

Provides policy and procedures for regulating off-road vehicles.

Appendix B: Interagency Agreements

Memorandum of Understanding
Among
U. S. Department of Homeland Security
and
U. S. Department of the Interior
and
U. S. Department of Agriculture
Regarding
Cooperative National Security and Counterterrorism Efforts on Federal Lands along the United States' Borders

I. Purpose and Scope

A. This Memorandum of Understanding (MOU) is made and entered into by the Department of Homeland Security (DHS), including and on behalf of its constituent bureau U.S. Customs and Border Protection (CBP) and the CBP Office of Border Patrol (CBP-BP); the Department of the Interior (DOI), including and on behalf of its constituent bureaus, the National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), and the Bureau of Reclamation (BOR); and the Department of Agriculture (USDA), including and on behalf of its constituent agency the U.S. Forest Service (USFS). Throughout this MOU, these three Departments, including their constituent agencies, may be referred to as "the Parties." Any reference to a bureau, agency, or constituent component of a Party shall not be deemed to exclude application to any appropriate bureau or constituent component of that Party. DHS recognizes that the BIA enters into this agreement only on its own behalf and not on behalf of any Indian tribe.

B. The geographic and jurisdictional scope of this MOU is nationwide. The Parties recognize the national security and counterterrorism significance of preventing illegal entry into the United States by cross-border violators (CBVs), including but not limited to the following: drug and human smugglers and smuggling organizations, foreign nationals, and terrorists and terrorist organizations. The Parties further recognize that damage to DOI and USDA-managed lands and natural and cultural resources is often a significant consequence of such illegal entry. The Parties are committed to preventing illegal entry into the United States, protecting Federal lands and natural and cultural resources, and - where possible - preventing adverse impacts associated with illegal entry by CBVs.

C. This MOU is intended to provide consistent goals, principles, and guidance related to border security, such as law enforcement operations; tactical infrastructure installation; utilization of roads; minimization and/or prevention of significant impact on or impairment of natural and cultural resources; implementation of the Wilderness Act, Endangered Species Act, and other related environmental law, regulation, and policy across land management agencies; and provide for coordination and sharing information

on threat assessments and other risks, plans for infrastructure and technology improvements on Federal lands, and operational and law enforcement staffing changes. This MOU provides guidance in the development of individual agreements, where appropriate, between CBP and land management agencies to further the provisions contained herein.

D. This MOU is entered into pursuant to the governing statutory authorities of each of the Parties.

E. The Parties acknowledge that CBP operation and construction within the sixty-foot "Roosevelt Reservation" of May 27, 1907 (along the US-Mexico border) and the sixty-foot "Taft Reservation" of May 3, 1912 (along the US-Canada border) is consistent with the purpose of those reservations and that any CBP activity (including, but not limited to, operations and construction) within the sixty-foot reservations is outside the oversight or control of Federal land managers.

F. This MOU supersedes any conflicting provision of any prior MOU or Memorandum of Agreement between the Parties or their subordinate bureaus or components.

II. Background

A. DHS, through its constituent bureaus (including CBP and its CBP-BP), is statutorily mandated to control and guard the Nation's borders and boundaries, including the entirety of the northern and southern land and water borders of the United States.

B. DOI and USDA, through their constituent bureaus, are statutorily charged as managers of Federal lands throughout the United States, including DOI and USDA lands in the vicinity of international borders that are administered as wilderness areas, conservation areas, national forests, wildlife refuges, units/irrigation projects of the Bureau of Reclamation, and/or units of the national park system. Tribal governments have primary management roles over tribal lands; however, the United States, through the BIA, may also have a stewardship or law enforcement responsibility over these lands. Many of these Federal and tribal lands contain natural and cultural resources that are being degraded by activities related to illegal cross-border movements.

C. The volume of CBVs can and has, in certain areas, overwhelmed the law enforcement and administrative resources of Federal land managers. In order to more effectively protect national security, respond to terrorist threats, safeguard human life, and stop the degradation of the natural and cultural resources on those lands, DOI and USDA land managers will work cooperatively with CBP to benefit from the enforcement presence, terrorist and CBV interdiction, and rescue operations of CBP.

III. Common Findings and Affirmation of the Parties

A. The Parties to this MOU recognize that CBP-BP access to Federal lands can facilitate rescue of CBVs on Federal lands, protect those lands from environmental damage, have a role in protecting the wilderness and cultural values and wildlife resources of these lands, and is necessary for the security of the United States. Accordingly, the Parties understand that CBP-BP, consistent with applicable Federal laws and regulations, may access public lands and waterways, including access for purposes of tracking, surveillance, interdiction, establishment of observation points, and installation of remote detection systems.

B. The Parties recognize that DOI and USDA have responsibility for enforcing Federal laws relating to land management, resource protection, and other such functions on Federal lands under their jurisdiction.

IV. Responsibilities and Terms of Agreement

A. The Parties Agree to the Following Common Goals, Policies, and Principles:

1. The Parties enter into this MOU in a cooperative spirit with the goals of securing the borders of the United States, addressing emergencies involving human health and safety, and preventing or minimizing environmental damage arising from CBV illegal entry on public lands;

2. The Parties will strive to both resolve conflicts at and delegate resolution authority to the lowest field operational level possible while applying the principles of this MOU in such manner as will be consistent with the spirit and intent of this MOU;

3. The Parties will develop and consistently utilize an efficient communication protocol respecting the chain of command for each of the Parties that will result in the consistent application of the goals, policies, and principles articulated in this MOU, and provide a mechanism that will, if necessary, facilitate the resolution of any conflicts among the Parties. If resolution of conflict does not occur at the local level, then the issue will be elevated first to the regional/sector office; if not resolved at the regional/sector level, then the issue will be elevated to the headquarters level for resolution;

4. The Parties will cooperate with each other to complete, in an expedited manner, all compliance that is required by applicable Federal laws not otherwise waived in furtherance of this MOU. If such activities are authorized by a local agreement as described in sub-article IV.B below, then the DOI, USDA, and CBP will complete the required compliance before executing the agreement;

5. The Parties will cooperate with each other to identify methods, routes, and locations for CBP-BP operations that will minimize impacts to natural, cultural, and wilderness resources resulting from CBP-BP operations while facilitating needed CBP-BP access;

6. The Parties will, as necessary, plan and conduct joint local law enforcement operations consistent with all Parties' legal authorities;

7. The Parties will establish a framework by which threat assessments and other intelligence information may be exchanged, including intelligence training to be conducted by all parties so that the intelligence requirements of each may be identified and facilitated;

8. The Parties will establish forums and meet as needed at the local, regional, and national levels to facilitate working relationships and communication between all Parties;

9. The Parties will develop and share joint operational strategies at the local, regional, and national levels, including joint requests for infrastructure and other shared areas of responsibility;

10. The Parties will share the cost of environmental and cultural awareness training unless otherwise agreed; and

11. The Parties will, as appropriate, enter into specific reimbursable agreements pursuant to the Economy Act, 31 U.S.C. §1535 when one party is to furnish materials or perform work or provide a service on behalf of another party.

B. Responsibilities and Terms Specific to DOI and USDA. The DOI and the USDA hereby recognize that, pursuant to applicable law, CBP-BP is authorized to access the Federal lands under DOI and USDA administrative jurisdiction, including areas designated by Congress as wilderness, recommended as wilderness, and/or wilderness study areas, and will do so in accordance with the following conditions and existing authorities:

1. CBP-BP agents on foot or on horseback may patrol, or pursue, or apprehend suspected CBVs off-road at any time on any Federal lands administered by the Parties;

2. CBP-BP may operate motor vehicles on existing public and administrative roads and/or trails and in areas previously designated by the land management agency for off-road vehicle use at any time, provided that such use is consistent with presently authorized public or administrative use. At CBP-BP's request, the DOI and the USDA will provide CBP-BP with keys, combinations, or other means necessary to

access secured administrative roads/trails. CBP-BP may drag existing public and administrative roads that are unpaved for the purpose of cutting sign, subject to compliance with conditions that are mutually agreed upon by the local Federal land manager and the CBP-BP Sector Chief. For purposes of this MOU, "existing public roads/trails" are those existing roads/trails, paved or unpaved, on which the land management agency allows members of the general public to operate motor vehicles, and "existing administrative roads/trails" are those existing roads/trails, paved or unpaved, on which the land management agency allows persons specially authorized by the agency, but not members of the general public, to operate motor vehicles;

3 CBP-BP may request, in writing, that the land management agency grant additional access to Federal lands (for example, to areas not previously designated by the land management agency for off-road use) administered by the DOI or the USDA for such purposes as routine patrols, non-emergency operational access, and establishment of temporary camps or other operational activities. The request will describe the specific lands and/or routes that the CBP-BP wishes to access and the specific means of access desired. After receiving a written request, the local Federal land manager will meet promptly with the CBP-BP Sector Chief to begin discussing the request and negotiating the terms and conditions of an agreement with the local land management agency that authorizes access to the extent permitted by the laws applicable to the particular Federal lands. In each agreement between CBP-BP and the local land management agency, the CBP-BP should be required to use the lowest impact mode of travel and operational setup reasonable and practicable to accomplish its mission. The CBP-BP should also be required to operate all motorized vehicles and temporary operational activities in such a manner as will minimize the adverse impacts on threatened or endangered species and on the resources and values of the particular Federal lands. However, at no time should officer safety be compromised when selecting the least impactful conveyance or operational activity. Recognizing the importance of this matter to the Nation's security, the CBP-BP Sector Chief and the local Federal land manager will devote to this endeavor the resources necessary to complete required compliance measures in order to execute the local agreement within ninety (90) days after the Federal land manager has received the written request for access. Nothing in this paragraph is intended to limit the exercise of applicable emergency authorities for access prior to the execution of the local agreement. The Secretaries of the Interior, Agriculture, and Homeland Security expect that, absent compelling justification, each local agreement will be executed within that time frame and provide the maximum amount of access requested by the CBP-BP and allowed by law;

4. Nothing in this MOU is intended to prevent CBP-BP agents from exercising existing exigent/emergency authorities to access lands, including authority to conduct motorized off-road pursuit of suspected CBVs at any time, including in areas designated or recommended as wilderness, or in wilderness study areas when, in their professional judgment based on articulated facts, there is a specific exigency/emergency involving human life, health, safety of persons within the area, or posing a threat to national security, and they conclude that such motorized off-road pursuit is reasonably expected to result in the apprehension of the suspected CBVs. Articulated facts include, but are not limited to, visual observation; information received from a remote sensor, video camera, scope, or other technological source; fresh "sign" or other physical indication; canine alert; or classified or unclassified intelligence. For each such motorized off-road pursuit, CBP-BP will use the least intrusive or damaging motorized vehicle readily available, without compromising agent or officer safety. In accordance with paragraph IV.C.4, as soon as practicable after each such motorized off-road pursuit, CBP-BP will provide the local Federal land manager with a brief report;

5. If motorized pursuits in wilderness areas, areas recommended for wilderness designation, wilderness study areas, or off-road in an area not designated for such use are causing significant impact on the resources, or if other significant issues warrant consultation, then the Federal land manager and the CBP-BP will immediately meet to resolve the issues subject to paragraphs IV.A.2 and IV.A.3 of this MOU;

6. CBP may request, in writing, that the land management agency authorize installation or construction of tactical infrastructure for detection of CBVs (including, but not limited to, observation points, remote video surveillance systems, motion sensors, vehicle barriers, fences, roads, and detection devices) on land under the local land management agency's administrative jurisdiction. In areas not designated as wilderness, the local Federal land manager will expeditiously authorize CBP to install such infrastructure subject to such terms and conditions that are mutually developed and articulated in the authorization issued by the land management agency. In areas designated or managed as wilderness, the local Federal land manager, in consultation with CBP, will promptly conduct a "minimum requirement," "minimum tool," or other appropriate analysis. If supported by such analysis, the local Federal land manager will expeditiously authorize CBP to install such infrastructure subject to such terms and conditions that are mutually developed and articulated in the authorization issued by the land management agency;

7. The DOI and USDA will provide CBP-BP agents with appropriate environmental and cultural awareness training formatted to meet CBP-BP operational constraints. The DOI and USDA will work with CBP-BP in the development and production of maps for use or reference by CBP-BP agents including, as appropriate, site-specific and resource-specific maps that will identify specific wildlife and environmentally or culturally sensitive areas;

8. The DOI and USDA will, as applicable, provide CBP-BP with all assessments and studies done by or on behalf of DOI or USDA on the effects of CBVs on Federal lands and native species to better analyze the value of preventative enforcement actions;

9. The DOI and USDA will assist CBP-BP in search and rescue operations on lands within the respective land managers' administration when requested;

10. The CBP-BP and land management agencies may cross-deputize or cross-designate their agents as law enforcement officers under each other agency's statutory authority. Such cross-deputation or cross-designation agreements entered into by the local land management agency and the field operations manager for the CBP-BP shall be pursuant to the policies and procedures of each agency; and

11. DOI and USDA will work at the field operations level with affected local CBP-BP stations to establish protocols for notifying CBP-BP agents when DOI or USDA law enforcement personnel are conducting law enforcement operations in an area where CBP-BP and DOI/USDA operations can or will overlap.

C. Responsibilities and Terms Specific to the CBP. DHS hereby agrees as follows:

1. Consistent with the Border Patrol Strategic Plan, CBP-BP will strive to interdict CBVs as close to the United States' international borders as is operationally practical, with the long-term goal of establishing operational control along the immediate borders;

2. If the CBP-BP drag any unpaved roads for the purpose of cutting sign under provision IV.B.2 above, then CBP-BP will maintain or repair such roads to the extent that they are damaged by CBP-BP's use or activities;

3. If CBP-BP agents pursue or apprehend suspected CBVs in wilderness areas or off-road in an area not designated for such use under

paragraph IV.B.5, then the CBP-BP will use the lowest impact mode of travel practicable to accomplish its mission and operate all motorized vehicles in such a manner as will minimize the adverse impacts on threatened or endangered species and on the resources and values of the particular Federal lands, provided officer safety is not compromised by the type of conveyance selected;

4. CBP-BP will notify the local Federal land manager of any motorized emergency pursuit, apprehension, or incursion in a wilderness area or off-road in an area not designated for such use as soon as is practicable. A verbal report is sufficient unless either CBP-BP or the land managing agency determines that significant impacts resulted, in which case a written report will be necessary;

5. If motorized pursuits in wilderness areas, areas recommended for wilderness designation, wilderness study areas, or off-road in an area not designated for such use are causing significant impact on the resources as determined by a land manager, or if other significant issues warrant consultation, then the CBP-BP and Federal land manager will immediately meet to resolve the issues subject to paragraphs IV.A.2 and IV.A.3 of this MOU;

6. CBP will consult with land managers to coordinate the placement and maintenance of tactical infrastructure, permanent and temporary video, seismic and other remote sensing sites in order to limit resource damage while maintaining operational efficiency;

7. CBP-BP will ensure that current and incoming CBP-BP agents attend environmental and cultural awareness training to be provided by the land management agencies;

8. CBP-BP will provide land management agencies with appropriate and relevant releasable statistics of monthly CBV apprehensions, search and rescue actions, casualties, vehicles seized, drug seizures and arrests, weapons seizures and arrests, and other significant statistics regarding occurrences on the lands managed by the land manager;

9. CBP-BP will consult with land managers in the development of CBP-BP's annual Operational-Requirements Based Budgeting Program to ensure affected land managers can provide input and are, in the early stages of planning, made aware what personnel, infrastructure, and technology the CBP-BP would like to deploy along the border within their area of operation; and

10. CBP-BP will work at the field operations manager level with affected local land management agencies to establish protocols for notifying

land management agency law enforcement officers when BP is conducting special operations or non-routine activities in a particular area.

V. Miscellaneous Provisions

A. Nothing in this MOU may be construed to obligate the agencies or the United States to any current or future expenditure of funds in advance of the availability of appropriations, nor does this MOU obligate the agencies or the United States to spend funds for any particular project or purpose, even if funds are available.

B. Nothing in this MOU will be construed as affecting the authority of the Partie in carrying out their statutory responsibilities.

C. This MOU may be modified or amended in writing upon consent of all Parties, and other affected Federal agencies may seek to become a Party to this MOU.

D. The Parties shall retain all applicable legal responsibility for their respective personnel working pursuant to this MOU with respect to, *inter alia*, pay, personnel benefits, injuries, accidents, losses, damages, and civil liability. This MOU is not intended to change in any way the individual employee status or the liability or responsibility of any Party under Federal law.

E. The Parties agree to participate in this MOU until its termination. Any Party wishing to terminate its participation in this MOU shall provide sixty (60) days written notice to all other Parties.

F. This document is an intra-governmental agreement among the Parties and doe not create or confer any rights, privileges, or benefits upon any person, party, or entity. This MOU is not and shall not be construed as a rule or regulation.

In witness whereof, the Parties hereto have caused this Memorandum of Understanding to be executed and effective as of the date of the last signature below.

Date: 3/24/06

Secretary of Homeland Security

Date: 3/31/06

Gale A. Norton

Secretary of the Interior

Date: 3/29/06

Secretary of Agriculture

Appendix C: Comments Received on the Draft Comprehensive Conservation Plan, Draft Wilderness Stewardship Plan and Draft Environmental Impact Statement (DCCP)

The Fish and Wildlife Service solicited comments on the DCCP from members of the public, local, state and federal agencies, and NGOs between May 5 and September 14, 2005. In addition to the opportunity to submit written comments during this period, interested parties were also invited to attend public hears held at Tucson (July 25, 2005), Sells (July 26, 2005), Ajo (July 27, 2005), and Yuma (July 28, 2005), Arizona.

The following appendix contains verbatim transcripts of testimony received at the public hearings and copies of written comments received by mail, email or facsimile. Written comments are reproduced in the order they were received. Where numerous respondents sent in the same comment, it is produced only once. A list of all commenters is available from the Fish and Wildlife Service, National Wildlife Refuge System, Southwest Region, Division of Planning at (505) 248-6813 upon request. To save space, the comment letters are somewhat reduced in size and printed two sheets to a page.

1.0 Public Hearing Testimony

Tucson Hearing, Monday, July 25, Holiday Inn Palo Verde, at 4550 South Palo Verde Boulevard.

First Speaker: John Steffens, 5109 N. Moonstone Drive, Tucson, Arizona 85750-9645

"I'm not affiliated with anybody. I'm not a member of any organization, group or committee. I just go out on Cabeza Prieta once or twice a year as much as possible. I looked at the plan, I completely threw away out of my mind that there would be a possibility to implement the one minimal alternative and the one maximal alternative. But when I got to reading it and thinking about what's going out there, I think that the real problem that you've got on Cabeza Prieta is coordination between organizations that have a responsibility out there. As an example: the permit system is different depending on who you call and who you talk to, and if you try to do it through the internet right now, you can't get any information about how to do it. The Marines were always easiest. The Air Force was the most ridiculous. Part of that coordination with the organizations is the Border Patrol. The last time we were out there we got, I spoke a couple of the Border Patrol agents at different times, and mentioned that people out here are supposed to have permits. They had no idea that there was even a permit system.

"So now I'm going to switch to something about the permit system. One of the alternatives has getting a permit on-line, doing all the paperwork on-line – that's wonderful. The system that existed some years ago, whereby you got the forms, you filled out the forms, you sent in the forms, and then somebody from the wildlife refuge sent you a paper, okay, with your permit on it. That paper was a different color each year, and you had to keep it in the window of your vehicle. When the Border Patrol flew over, which they rarely did back then, they could see the permit in your window. They can't see a business card in

your window, and they really don't care. So they ought to know what a permit looks like, and you might want to consider going back to this colored permit system.

"Next thing, size of groups and animals. We had an occasion where we sat on side of the road by the near marker on the lava flow for an hour and 15 minutes. A group of 70 off-road vehicles from Phoenix went through, as a group. Each one had at least two people in the vehicle. That's ridiculous that they should get permits for that size groups. Animals: we had the occasion at Tule Well, around Thanksgiving, where there was a group of people there – I don't know what they were doing – they had horses. They left two days before we did. We spent the next two days shoveling horse manure into a corner to get it out of the way. They left it there. The penalties for doing something like that ought to be enforced, if possible.

"I said I'm not a member of any group; I'm not. I go out there with a group of family, my grandchildren (my children don't like to go out there, but the grandkids do). One of the fears that I have is that access to the Cabeza Prieta and all of our wilderness areas is tending to go those who are members of some special interest group. If you're not part of the in-crowd, you can't get out there, or you can only get out there at restricted times. I think you have to be careful about restricting the average 'Joe Blow' from going out there. Along those lines, I don't' like this March 15 to July 15 thing, because that's when I like to go out there, March 15. If you could get the pronghorns to move their fawning two weeks later, I'd appreciate it. Put that in your plan and see if it works".

Sandy Bahr, 202East McDowell Road, #227, Phoenix, Arizona 85004.

"I'm with the Sierra Club and live in Phoenix. I'm here representing the Sierra Club's Grand Canyon Chapter, which is the Arizona Chapter, and we have over 13,000 members in Arizona, a lot of whom, I should say many of whom, enjoy the Cabeza, and many more of whom care about it. Sorry if I'm not speaking up enough, it's a loud room. Despite the summer meeting, we appreciate you actually letting us know there were meetings. We did get a notice, and we will be providing detailed written comments. I just wanted to take the opportunity to say a few things this evening.

"First of all, we do appreciate the US Fish and Wildlife Service taking more of an ecosystem approach to management of the Cabeza and for looking at doing integrated plans. We want to ensure that Wilderness and protection of the Wilderness is not lost in that integrated plan, however, and want to encourage the Service to support the strongest protection of Wilderness and wilderness values for the Cabeza. As you indicated earlier, this is a significant wilderness area, a high profile wilderness area, and it's important that it be protected. We also would like to see protection of wildlife, of course. The maximum protection for wildlife should be on the top of the list, including Sonoran pronghorn, bighorn sheep, bats and all the other wildlife on the refuge. We think that there are elements in Alternative 2 which provide the most protection of wilderness that definitely should be implemented. There are also some elements in Alternatives 3 and 4 that we think could be incorporate into a final preferred alternative.

"We encourage you to look at limiting additional water developments and minimizing development of waters in wilderness. We realize that the science isn't necessarily all that

popular in a lot of government entities right now, but we think more research is needed on waters relative to wildlife and the effect of these waters on the overall habitat, not just one species. We support the continuation of working with other agencies and increased coordination with Border Patrol, the National Park Service, the Tohono O'odham Nation and others, and did see it stated in the plan a commitment in the plan to do so. We think that's a positive. Also appreciated the proposal in Alternative 3 to look at dealing with exotic plants and we had a little discussion about that earlier and the fire risk. We think that it is important to remove newly found exotics whenever possible. We also support the establishment of a plant nursery in the non-wilderness area for revegetation purposes and encourage the managers to collect the seeds from the refuge itself whenever possible. We also, in I think it was in Alternative 4, support the draft proposal to work with the Mexican government to try to better control the spread of exotics along Mexican Highway 2. We think that's important as well.

"Okay, that's four minutes? I was speaking too slowly. In light of budget concerns, we think that taking a minimalist approach to additional development is warranted. Thank you."

Jan Anderson, 3906 West Ina Road #200 PMB195, Tucson, Arizona 85741

"I'm with the local group from the Sierra Club, the Rincon Group, and I'm the Conservation Chair, and we have 3,800 members in Arizona, and I'll be echoing some of the things Sandy just spoke about. We believe that the strongest support for this plan should go to protecting Wilderness and wilderness values, because that provides natural protection for wildlife. We like the ecosystem approach that you've taken, because it considers Wilderness as connected to the native wildlife on the refuge. And we support connecting fragmented habitats via wildlife travel corridors. We like the idea of closing 60 miles of the 145 miles of administrative tracks that was proposed in Alternative 2, because these disturb and fragment habitat. We believe there should be no additional water development and those existing should be tested for pathogens, as was mentioned in Alternative 2. We support protecting cultural resource areas from damage due to unauthorized entry, through periodic patrol by refuge law enforcement officers. While an expansion of the visitor center to include office and classroom space is beneficial by permitting public education, protecting the natural resources within the refuge should be our first priority.

"There needs to be a long-term strategy for management of the Sonoran pronghorn population. The captive breeding areas are not natural and won't sustain the population for the long term. We also support the continuation of working with agencies such as the Border Patrol, the National Park Service and the Tohono O'odham Nation. Exotic and invasive species control measures should be included in the final decision. We like the idea of a plant nursery proposed in Alternative 3, and also recommend getting the seeds from the refuge itself. And if you could, implementation of these comments would necessitate the creation of an additional alternative, since elements of Alternatives 2, 3 and 4 are included here. Thank you."

Brian Dolan, 511 E. Robert Circle, Tucson, Arizona 85704

"I'm a Past President of the Arizona Desert Bighorn Sheep Society, and I guess by default, I'm here representing the 1,100 members of that organization in the state. Our organization has been involved in the Cabeza Prieta, management Cabeza Prieta, and the operation of Cabeza Prieta for many, many years. A lot of the members that have passed the torch on to me frankly have grown tired and weary of the process. I'm the last of that breed. I'm trying to recruit somebody to take it over after I get old and tired and worn out. But I think that one of the things that I would like to say (because you will be getting written comments from the Sheep Society, there's a committee of four of us who are preparing our comments), but one of the things that I'd like to reiterate to the folks in the audience and to the staff is that there was a time when hunters and people in the Sheep Society were some of the biggest Wilderness advocates in the State of Arizona. It's because of the treatment that we feel that we've gotten, through what's been going with Cabeza Prieta that's kind of soured a lot of us. I, myself, was a card-carrying member of the Wilderness Society back in 1990, and I have seen what's happened. We have to get over this petty bickering about closing 60 miles of roads because of fragmented habitats. That isn't the problem at Cabeza Prieta. That 60 miles of road is just going to be a 'feel good' for somebody. That's not the issue that we're talking about, but because we seem to want to draw these lines in the sand, it's just perpetuating the same problem. I really wish we'd reach out and do what's the best for the resource, and unfortunately we have to go through big lengthy processes like this for the EIS. I'd like to say that the Fish and Wildlife Service, John, Roger and your staff, you guys have done an admirable job with this EIS. I've read it cover to cover, but I haven't gone back and studied it in depth, but can tell you, I actually enjoyed reading it. You guys did a really, really good job. Some of the discussion sections that are in there that talk about roads, that talk about wildlife waters, that talk about bighorn sheep populations, that talk about ATVs and use of the roads; you did a really good job of explaining where those issues really fit in the overall operation of the Cabeza Prieta. I'm confident that we're going to end up with something that's going to be workable, and I for one cannot wait for us to get something in place, because we have been waiting for far too long. In my opinion we have waiting for 19 years to have something in writing that's going to tell us how we're going to operate the Cabeza Prieta. For an area as big as that is, and as important to the state's wildlife, it's been a shame that we haven't had it beforehand."

Paul Huddy, 5233 E. Woodspring Drive, Tucson, Arizona 85712

"I'm a cofounder of Friends of Cabeza Prieta, and I and quite a few other people have been working on these issue for quite a long time. My primary issue is, as it has been, for a long time, preserving Cabeza Prieta in its natural state. That is what we have a Wilderness designation for. So I'd like to state first and foremost, that what we expect of the US Fish and Wildlife Service is preservation of the natural resource, because that's what is of value out there, in its natural state as much as we can do that, and also maintaining the legal requirements of wilderness, because that's what that is. I don't see the primary problem being the bighorn sheep diet, by the way. The problem is all those people coming across the blasted border. That, unfortunately, is not something you guys can do a great deal about. When John here – our first speaker was talking about agency coordination, I had to laugh because that's something we've been saying for a long time has been a serious

problem here in the Goldwater Range. After all these years, you'd think we'd have it worked out. So I hope you guys will work hard on getting the agencies together on this, because, your mandate is what we're concerned about. The more you can work with these other agencies and make it clear to them that this is a wilderness, and that what we're trying to do is protect natural values, the more impacts you have on your ability to do that.

"I asked about the water developments because we've been talking about this a long time. Needless to say – I've, we have, attended a lot of meetings about this for a long time, and no new water developments should be put in there until somebody demonstrates that these are: a) effective in what they're supposed to do, and b) that they don't do damage. And that concerns me a great deal, because you water out there, everybody for miles heads for it. You put in new water sources, you're going to cause more damage and the wildlife that's out there is out there because, geez, it's awfully shy, and the more people we have running around that desert the more difficult it is for those guys to survive. So let's make decisions – the priority part of the decisions –preservation of the natural values out there, and Wilderness protection. Thank you. Oh, one more thing, I want to mention horses. Horses are becoming more used, and there's a kind of feeling that 'horses are natural, so it's all right.' But I have reservations about that, and so do a lot of people. Horses have big feet, and they're big animals. They're bigger animals than are normally there. On top of that, they eat exotic stuff, and they spread exotic stuff all over the place. So when I hear from folks like John that he's finding horse stuff all over the place, it concerns me a great deal. In other parts of the country the Fish and Wildlife Service and other agencies have basically made it a rule that you have to carefully feed your horses before you take them out in a wilderness area. I'd like to see the Fish and Wildlife Service do the same at Cabeza Prieta, because that's a very obvious source of spreading invasive plants. Thanks."

Joe Sheehy, 6381 N. Camino Padre Isidoro, Tucson, Arizona 85718

"I'd like to speak about the water developments and my opinion of the importance of the water developments on the Cabeza Prieta. In participating in numerous summer waterhole counts on the Cabeza Prieta in the late 70s and early 80s, you'd be hard pressed to convince me that the sheep don't — and other wildlife – bobcats even white-winged doves and quail, and everything else, doesn't depend on that water. I would encourage that we maintain the existing waters and also allow the use of administrative roads to do that."

Bill Broyles, 5501 North Maria, Tucson, Arizona 85704

"This process; I'm glad to see all you people, because I think I've known many of you for years. I can remember sitting at the Cabeza office, it seems like 10 or 11 years ago, starting to have a meeting about this management plan. And Brian is quite right, we need to have one in place and we need to have the best one we can. Because part of what we need to do is to be looking beyond this room, this meeting in 2005. We need to look beyond the agency labels and the affiliation labels; whether you belong to this club or that club. John belongs to no club, and I think I belong to every club. I used to belong the sheep society, but they wouldn't cancel my checks any more. I try to cover the whole spectrum, because we need to realize that these little battles between ourselves are kind of like sibling rivalries. Kind of 'what are we going to have for dinner tonight?' The real threats

are the big threats, border threats, the threats to, in Congress, for example, the threats against wildlife, wilderness, public lands, can you drill oil. And it may amaze to know that there have been some oil wells south of the refuge, and there's a report of one that was on the refuge, in a 1935 paper, but I don't know anything about that. We need to look beyond the boundaries of the refuge in ecosystem management. We need to look to the needs of all users of the refuge, hunters, hikers, campers photographers, because the real threat is that in 25 years from now this state is going to have probably 20 million people, or 15 million, 15, not 20, but right now we're only 5. So if you imagine the public pressure on these precious lands for those activities that we value. This is the heartland, this is the last wilderness, this is the last refuge. This where when people like myself, like Paul, like Brian, like John, probably the rest of you want to get out of the house and really get away, and really have a camping experience and really get out and see things that are natural, this is where we go. And for all those reasons, we have to take the very best care we can of it and this management plan had better be good."

Sells Public Hearing, Tuesday, July 26, Tohono O'odahm Tribal Council Chambers.

No formal public testimony was submitted.

Ajo Public HearingWednesday, July 27, Ajo Community Center in Bud Walker Park, 290 West 5th Street.

No formal public testimony was submitted.

Yuma Public Hearing, Thursday, July 28, Yuma Civic and Convention Center, 1440 West Desert Hills Drive.

Jon Fugate, 2428 West 13th Place, Yuma, Arizona, Arizona 85364

"On behalf of the Yuma Valley Rod and Gun Club, I'd first like to say that our organization has been involved in this process since it began way back in 1994, 90 something, way back when. We got to a point where there was a document that finalized, and even though we had some concerns still with that document, we were at an opportunity to live with it and move forward, but others saw fit to believe that it was not an appropriate document and force the Fish and Wildlife Service obviously to do an environmental impact statement. The only good thing about that is that when you get this one done, there isn't any more. It can be contested, you can have to go to court, you can have to do it, but I personally feel, on behalf of the club, that if they take you to court for whatever reason we can imagine under the sun, based on what's in the proposed alternative, and on things that be taken out of 5, or out of any of it, but we're focusing on alternatives 4 and 5, you guys would win. What has happened is that recently, because of a lot of things, probably the main thing is the change of administrations, change of Fish and Wildlife Service Directors, Regional Directors; lots of things have changed; changed refuge managers; people started realizing that you know, Cabeza's just a refuge just like all other refuges, and it needs to be managed consistent per the guidelines set forth for refuge management. The number one is that wildlife comes first. The proposed alternative signifies that, same as in 5, 5 just makes it a little more, at least from a management perspective.

"A couple of things that we're asking for serious consideration on, that are not in the proposed alternative are: in regards to public vehicular access it says Proposed Alternative, motorized access in non-wilderness, on page 130 of the matrix indicates, "on center 30 meters (100 feet) of the road corridor," we assume that means 50 on either side of the center of the road. We firmly believe that 60 meters or 200 feet on center of road corridor is more appropriate and would be consistent with allowances on Kofa. I don't need to go on that, same refuge. Both refuges were set aside by the same president on the same day for the same reason. They both have refuge wilderness in them. One has a lot more roads than the other and I think that rationale is appropriate. Now the next one you might not think, particularly Roger, and I don't mean that derogatory. Additionally, although it was specifically addressed, it is our understanding that some administrative roads, trails, have or will be improved for the enhancement of enforcement capabilities. It is our firm belief that utilization of these improved roads by the public could be justified, as it would decrease impacts associated with public use which currently occurs only on three basic routes the Camino, Christmas Tree and Charlie Bell. Enhancement of enforcement capabilities would very likely increase should this allowance occur.

"The other two changes that we haven't spoken about tonight are camping, and there two changes that the club firmly believes should occur. We believe that Alternative 5, under the heading of Wilderness Recreation and Camping, should be the proposed action, as presented in the matrix on pages 129 and 131, respectively. And that's it."

Cary Meister, P.O. Box 6395, Yuma, Arizona 85366-6395

"I'm Conservation Chairman for the Yuma Audubon Society. We will be submitting written comments at a later date. I haven't had an opportunity to completely read the plan at this point, but I would like to support the idea that not every refuge is the same and that different types of management are appropriate in different types of refuges. Some refuges can offer rather intensive recreation opportunities, whereas other refuges can offer much less intensive recreation opportunities. We have some examples of that in the narrative. Cabeza Prieta offers a less intensive opportunity for the public, Kofa more so. Again, along the Colorado River, Cibola offers more of an opportunity for recreation of an intensive variety, whereas there are parts of Imperial that offer less intensive recreation varieties. I think that what we need is a continuum of recreation opportunities by refuge, and Cabeza Prieta can very well fulfill the function of a less intensive recreation opportunity refuge. Thank you for the opportunity to comment."

2.0 Written Comments

Written comments received during the public comment period are reproduced on the following pages.

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STEVE K. FERRELL

September 7, 2005

Mr. John Slown
Southwest Region, Planning Division
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, NM 87103

Re: Draft Comprehensive Conservation Plan, Draft Environmental Impact Statement and Draft Wilderness Stewardship Plan

Dear Mr. Slown:

The Arizona Game and Fish Department (Department) reviewed the Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan for the Cabeza Prieta National Wildlife Refuge. We appreciate the U.S. Fish and Wildlife Service's efforts to include the Department in meaningful discussions during the development of these important documents. Our page-specific comments are attached for your consideration. As we discussed, we would like to meet with the U.S. Fish and Wildlife Service to discuss these comments and our concerns in further detail.

Again, the Department appreciates the opportunity to be involved in the development of the CCP. Please contact Mr. Russ Engel at (928) 341-4042 if you have any questions regarding the Department's comments.

Sincerely,

Duane L. Shroufe
Director

DLS:rke

cc: Larry Voyles, Regional Supervisor, Region IV
Bob Broscheid, Chief, Habitat Branch

Arizona Game and Fish Department's Comments on the Draft Comprehensive Conservation Plan, Environmental Impact Statement and Wilderness Stewardship Plan

September 7, 2005

Page 42, 1.13.3 Issue to be Determined Pending Adoption of Wilderness Policy Revisions: Wheeled Game Carriers, Last sentence
The Department believes that wheeled game carriers should be allowed until an official policy is established. This would be consistent with current management on the Kofa National Wildlife Refuge.

Page 102, 2.5.1.1.1.2 Developed Waters (Sonoran pronghorn)
The Department believes that the proposed alternative should provide an opportunity for constructing new waters (not limited to only temporary or emergency waters) for Sonoran pronghorn based on up-to-date information.

Page 102, 2.5.1.1.1.5 Supplemental Feeding and Forage Enhancements (Sonoran pronghorn)
The Department believes that the proposed alternative should provide an opportunity for supplemental feeding and construction of additional forage enhancement plots if a need is identified through current information and/or conditions.

Page 102, 2.5.1.1.1.7 Predator Management (Sonoran pronghorn)
The Department believes that the proposed alternative should provide for the opportunity to control any predator (not just coyotes) to benefit Sonoran pronghorn, based on available information.

Page 104, 2.5.1.2.1 Developed Waters (bighorn sheep)
The Department believes it should be clarified that the decision to build additional waters for bighorn sheep would be based on all available information to date, which would include the University of Arizona study.

Page 104, 2.5.1.2.4 Predator Management (bighorn sheep)
The Department believes that the proposed alternative should provide for the opportunity to control predators to benefit bighorn sheep based on available information.

Page 108, 2.5.3.1 Managing Visitor Access
The Department does not understand the need to restrict vehicles to within 50 feet of the center of the road. Congress established a 200-foot corridor for roads within wilderness. We do not believe they intended to further restrict vehicles within this corridor or they would have established a smaller corridor. The Department further believes that the potential impacts associated with vehicles using the additional 100 feet within these corridors would not be significant when considered on a refuge-wide basis. This would also be consistent with current management on the Kofa National Wildlife Refuge.

Page 111, 2.5.3.2.2 Mule Deer, 2.5.3.2.3 Small Game, and 2.5.3.2.4 Predators
The Department believes that mule deer, small game and predator hunts should be implemented upon determination that populations can support hunting and the U.S. subpopulation of Sonoran

pronghorn has stabilized and would not be jeopardized by such hunts. We do not support the stipulation that predator hunts would only be authorized if determined to be beneficial to Sonoran pronghorn.

Page 113, 2.5.3.6 Managing Visitor Camping
The Department would like to see the refuge allow collection and use of dead and down wood for campfires refuge-wide. We do not believe that this use (at anticipated levels) would have an adverse effect on resources. Campfires could be restricted during times of extreme fire potential and the use could be monitored and restricted if adverse impacts to resources are documented.

Page 127, Table 2.8 Endangered Species, Alternative 5
The Department notes that Alternative 5 provides for the development of additional waters and forage enhancement plots for Sonoran pronghorn, which is not listed in the table.

Page 127, Table 2.8 Desert Bighorn Sheep, Alternative 4
The Department believes it should be clarified that Alternative 4 provides the opportunity to construct additional waters for bighorn sheep, based on research.

Page 127, Table 2.8 Desert Bighorn Sheep, Alternative 5
The Department notes that Alternative 5 provides for predator control and the development of forage enhancement plots for bighorn sheep, which is not listed in the table.

Page 128, Table 2.8 Predators, Alternatives 4 & 5
The Department notes that Alternative 4 states that predator hunts would only be implemented if determined to be beneficial to Sonoran pronghorn while Alternative 5 does not have that stipulation. This difference is not pointed out in the table. See above (under Page 111) for comments specific to the Proposed Alternative.

Page 129, Table 2.8 Wilderness Recreation, Alternative 5
The Department did not see any restriction on campfires in wilderness described under Alternative 5 and there is a 14-day restriction on length of stay described under Alternative 5. These are both contrary to what is listed in the table.

Page 130, Table 2.8 Hunting, Alternative 4
The Department notes that Alternative 4 states that a predator hunt would only be implemented if determined beneficial to Sonoran pronghorn. This is not pointed out in the table and the Department does not support this stipulation.

Page 131, Table 2.8 Camping, Alternative 4
The Department believes it should be clarified in the table that wood campfires would only be allowed at the 3 established campsites and that group size would be restricted to 8 people. As stated above, the Department would like to see the refuge allow the use of dead and down wood for campfires refuge-wide.

Pages 396 and 399, Stipulations Necessary to Ensure Compatibility
The Department recommends removing the stated stipulation that "aircraft users must adhere to FAA 2,000 above ground level restriction". We believe this is beyond the control and

jurisdiction of the USFWS and are unaware of any law or regulation requiring aircraft to stay above 2,000 feet. With few exceptions, of which the Cabeza Prieta National Wildlife Refuge is not a part of, the Department is only aware of an FAA "advisory" that addresses the altitude of aircraft flying over refuges or wilderness.

1

May 8 2005

John Slown, Biologist/Conservation Planner
USFWS. NWRS,Southwest Region, Planning Division
P.O.Box 1306
Albuquerque, New Mexico 87103

Dear John:

Thanks for including me in the opportunity to comment .
By all means the "no action" plan should be followed.
The balance of nature does not need human help.

Russ Clapper, Retired RM
(42 years experience)

June 26, 2005

USDOI USFWS CABEZA PRIETA - NATIONAL REFUGE

ALL TAXPAYERS PAY TO SUPPORT THIS NATIONAL AREA AND IT IS NOT SIMPLY A LOCAL'S PLACE TO PROFITEER. THE INTEREST OF NATIONAL TAXPAYERS IS PARAMOUNT.

THE USE OF THE WORD "REFUGE" IS AN ATTEMPT TO FOOL THE PUBLIC. SINCE YOU ALLOW BLOODLETTING, KILLING, VIOLENCE, GUNS THIS PLACE IS NO LONGER A REFUGE. GET THE BLOODTHIRSTY HUMAN PERVERTS OUT.

THE FOLLOWING SHOULD BE BANNED IN THIS ARE:
1. HUNTING
2 TRAPPING
3 ALL NEW ROADS
4 GRAZING, LOGGING, MINING OR DRILLING
5 ALL TWO STROKE VEHICLES
6 PRESCRIBED BURNING

B. SACHAU
15 ELM T
FLORHAM PARK NJ 07932

#3

United States Department of the Interior

National Park Service
Organ Pipe Cactus National Monument
10 Organ Pipe Drive
Ajo, Arizona 85321-9626

IN REPLY REFER TO:

L7619

July 14, 2005

John Slown
Biologist Conservation Planner
USFWS, NWRS, Southwest Region, Planning Division
Post Office Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Slown:

Thank you for the opportunity to provide comments on the Draft Comprehensive Conservation Plan, Wilderness Stewardship Plan, and Environmental Impact Statement (EIS) for Cabeza Prieta National Wildlife Refuge. Overall, we were pleased with the document and the effort made to reduce impacts to the local resources while protecting and managing Cabeza Prieta National Wildlife Refuge. We have a few comments specific to particular sections and items contained in the EIS. Specifically:

1. Throughout the document, Bassarisc Tank is misspelled as 'Basseric Tank'.

2. Page 49, Section 2.1.1.1 "Sonoran Pronghorn": The paragraph preceding the inset identifies eight major recovery efforts directed at Sonoran pronghorn recovery. However, the narrative that follows, discusses some of these recovery efforts, but not all eight. We recommend an expansion of this section to include all eight recovery efforts.

3. Page 52-55, Section 2.1.1.1.3, "Captive Breeding/Translocation": The National Park Service (NPS) and Organ Pipe Cactus National Monument support the Sonoran pronghorn captive breeding facility and translocation strategy. We hope to provide financial support for this facility and effort in FY06 through FY08 and look forward to a continuing cooperative effort between the United States Fish and Wildlife Service (USFWS), NPS, and other federal agencies.

4. Page 55, Section 2.1.1.1.4, "Area Closures": The plan, as written, appears to only address the use of 'Area Closures' as a means of mitigating impacts from public

activities. We recommend a discussion on how area closures will protect Sonoran Pronghorn from activities associated with illegal migration, drug smuggling, and law enforcement interdiction efforts, especially during critical times of the year (e.g., March through September).

5. Page 59, Section 2.1.3.2, "Border Law Enforcement": We recommend that the draft EIS also address, under this section, management actions associated with reducing human disturbance on Wilderness values from activities associated with illegal border crossings (e.g., illegal migrants, drug smugglers, and law enforcement interdiction efforts). Measures such as, vehicle barriers, coordination/cooperation with other federal agencies to minimize off-road vehicle traffic, and concentrating law enforcement efforts near the border will serve to maximize wilderness preservation and reduce migrant mortalities.

6. Pg 101, Section 2.5.1.1.1.2, "Developed Waters": The NPS supports the use of photovoltaic powered water level sensors at remote water stations. Such devices should minimize the number of trips required for water trucks to service these areas, and, in turn, reduce the potential for vehicle disturbance to Sonoran pronghorn, road damage, and vehicle upkeep.

Pg 104, Section 2.5.1.2.3, "Population Goal": A desert bighorn sheep survey conducted in 1995 by Henry (1995) on Organ Pipe Cactus National Monument may provide a comparison for bighorn sheep target population in areas without developed waters on Cabeza Prieta National Wildlife Refuge. (Literature Cited: Henry, Robert. 1995. Desert bighorn sheep survey on Organ Pipe Cactus National Monument. Report to the National Park Service, August 1995. Arizona Game and Fish Department, Region IV, Yuma, AZ 9 pp + appendices.) Although, Organ Pipe Cactus National Monument has some minimally developed waters, there are few that remain and, of these, none are actively maintained.

Pg 104, Section 2.5.1.2.4, "Predator Management": We recommend the use of a motion-triggered camera system to investigate the use of developed and un-developed waters by predators in the refuge. Newer systems, using digital image storing, are now available and may provide information on predator use of water storage devices and tinajas, as well as interactions between predators and other wildlife.

Pg 105, Section 2.5.1.3.3, "Raptors and Ravens": Organ Pipe Cactus National Monument does not currently have in place established protocols for inventorying and monitoring raptors and ravens. Monument staff currently monitors the productivity of individual raptor nests. However, the scope of this effort is limited to one or two sites within the entire monument. Known cactus ferruginous pygmy-owl breeding sites are monitored each spring for occupancy only.

Pg 106, Section 2.5.1.3.6, "Exotic/Invasive Species": We recommend the document provide a discussion on the impact of non-native plant seed dispersal from trespass livestock on the refuge. Permitted stock animals can also disperse non-native pant seeds. We recommend a reiteration, under this section, on stock animal restrictions as articulated on page 111, Section 2.5.3.1.

We look forward to receiving a copy of the Final Comprehensive Conservation Plan, Wilderness Stewardship Plan, and Environmental Impact Statement (EIS) for Cabeza Prieta National Wildlife Refuge. Please feel free to contact me at 520-387-6849, ext. 7500 if you require further assistance from monument staff on this topic.

Sincerely,

Kathy Billings

Kathy Billings
Superintendent

cc:
Roger Di Rosa, Refuge Manager, Cabeza Prieta National Wildlife Refuge

3 Dear John:

I am outraged to hear that the border patrol is tearing up the Cabeza Prieta desert using their vehicles and drag equipment. I fell the same way about the steel wall that is being constructed along the border and that vegetation will be removed to make tracking intruders more easily!

Please push for having wildlife friendly measures used in Cabeza Prieta!!! The wildlife and plants of the desert must not be sacrificed in order to guard the border.

Yours truly,

Mary Jean Hage
A Friend of the Sonoran Desert

July 21, 2005

I am a 65 year old voting conservative republican in Arizona who opposes roads in any wilderness, including the Cabeza Prieta National Wildlife Refuge.
Cal Lash
2904 East Desert Lane
Phoenix, Arizona 85042

July 21, 2005

The Cabeza Prieta is very important for saving the pronghorn anti lope.
Please support the increased protection of this area.

Betty Roberts

July 29th, 2005

John Slown, Division of Planning
NWRS R-2
U.S. Fish & Wildlife Service
Albuquerque, NM 87120

Wildlife functions best in the absence of Man. Your "agenda of interference" by allowing administrative use of "roads" within Wilderness will only promote wildlife management by man. Wildlife doesn't need managing, wildlife simply needs to be left alone. And the large, empty, wide open spaces that Wilderness areas provide is the best way to insure that wildlife is left alone. There is no need to haul water, improve/maintain springs and build sundry other structures for the supposed "improvement" of wildlife habitat. These administrative roads and associated improvements at the ends of these "roads" need to be removed. Then the roads need to be obliterated. The Earth and its community of Life does not need the meddling hand of Man to make things better. The concept of Wilderness demands a minimum tool approach when dealing with wildlife. Hauling water and improving and maintaining springs is not a minimum tool approach to solving wildlife problems, but rather is part of the problem to begin with. Your "hands on" approach to wildlife management does not benefit wildlife. The existence of designated Wilderness is, in and of itself, the best wildlife management tool you have. The long term health and viability of the Pronghorn Antelope will, in the final analysis; benefit from the huge, open spaces that Wilderness will provide. The obliterating of roads will promote the "making whole" of wildlife habitat that is slowly being fragmented by the existence and use of "roads". The mandate of Wilderness is to let ecological process work in the absence of Man. Mans works and ways have no place in a Wilderness area.

When you obliterate roads you also have the opportunity for protecting cultural resources as well. For cultural resources are also best managed by being left alone and unadvertised Wilderness is a proper and good tool for managing these cultural resources.

You need to address the number of permitted vehicles per party that can use the road that runs through Cabeza Prieta. The number of vehicles per party should be no more than five, with an average of three people per vehicle. The maximum group size inside the Wilderness should be no more than fifteen people. One needs to keep in mind that this place is a Wildlife Refuge and not an ORV playground. Wildlife comes first. Excessively large "heards" of vehicles will have a negative impact on wildlife and negatively impact the Wilderness experience that the refuge can provide. I have heard that parties of 40 vehicles sometimes traverse across the refuge, apparently all under one permit.

Thank you for the opportunity to comment.
Jim Vaaler

#8

Comments for the U. S. Fish & Wildlife Service on the Draft Comprehensive Conservation Plan, Draft Environmental Impact Statement, and Draft Wilderness Stewardship Plan for the Cabeza Prieta National Wildlife Refuge.

Submitted by: Jan Anderson, Conservation Chair, Sierra Club Rincon Group, on behalf of its 3800+ members in southern Arizona.

July 23, 2005

- We request the USFWS support the strongest protection of wilderness and wilderness values for the Cabeza because wilderness provides maximum protection for wildlife habitat. We support the ecosystem approach the USFWS has taken in their draft EIS/CCP because it considers wilderness as ecologically connected to the health of all the native wildlife on the refuge. We also support connecting fragmented habitats via wildlife-travel corridors.

- We support the closure of 60 miles of the 145 miles of administrative tracks open of the refuge as proposed in Alternative 2 because these disturb and fragment habitat.

- We believe there should be no additional water developments and those existing should be tested for pathogens. (Alternative 2)

- We support protecting cultural resource areas from damage due to unauthorized entry through periodic patrolling by refuge law enforcement officers.

- While an expansion of the visitor center to include office and classroom space is beneficial by permitting public education, protecting natural resources within the refuge should be our first priority.

- There needs to be a long term strategy for management of the Sonoran pronghorn populations. Captive breeding areas are not natural and won't sustain the population in the long-term.

- We support the continuation of working with agencies such as the Border Patrol and National Park Service as well as cooperation with the Tohono O'odham Nation.

- Exotics/Invasive species control measures should be included in the final decision. The plant nursery proposed in Alternative 3 is an excellent idea as long as seeds from the refuge are used for it.

Implementation of these comments would necessitate the creation of an additional alternative since elements in alternatives 2,3,and 4 are included here.

#9

John Slown
Division of Planning, NWRS R-2
U.S. Fish & Wildlife Service
PO Box # 1306, Albuquerque, NM 87120.
Email: john_slown@fws.gov
July 23, 2005

Dear Mr. Slown:

I do a lot of hiking and peak climbing here in Southern AZ and have climbed peaks in the Cabeza Prieta region in the past and plan to hike and climb in the area again to reach some more peaks. I think that the Cabeza Prieta region has outstanding ecological, geological, cultural, and educational values. However, these can be destroyed by illegal off-road activity and invasive vegetation which tends to follow vehicle traffic.

I urge you to work to provide maximum protection for wildlife habitat. Please support the ecosystem approach the USFWS has taken in their draft EIS/CCP as it considers wilderness as ecologically connected to the health of all the native wildlife on the refuge. My wife and I do wildlife monitoring for the Sky Island Alliance here in Tucson and I realize the importance of connecting fragmented habitats via wildlife-travel corridors.

Reducing the road network within the Cabeza Prieta will aid wildlife and reduce the opportunity for invasive species by closing 60 miles of the 145 miles of administrative tracks open on the refuge. Roads do not belong in wilderness. (Alternative 2)

Please support protecting cultural resource areas from damage due to unauthorized entry. Periodic foot patrolling by refuge law enforcement officers will help avoid damage and discourage unauthorized entry to these sensitive areas. However, the USFWS needs to specify exactly how these patrols will be done (foot, horse, ORV, etc.) to ensure that the patrolling does not do more harm than good. If patrols can be done with minimal effects, we suggest that the refuge staff take an initial inventory of known sites so that references can be made on how much damage is occurring in these areas. Training border law enforcement on the sensitivity of the areas will also help to avoid damage during border law enforcement operations. Hiking trails should not divert visitors into these sensitive areas and the known areas of cultural occupation should remain unpublished, including in the visitors center.

I believe you need to expand the visitor center to include office and classroom space. Public education is a very important part in the fight to save our natural resources. The natural resources within the refuge should be our first priority, however. The USFWS should work to ensure that expansion of the visitor's center does not increase car and foot traffic so that it adversely affects the refuge resources. The preservation of the refuge and its vastness of undisturbed, pristine wilderness should serve as the ultimate educator to visitors.

Please produce and implement a strategy for the long-term management of Sonoran pronghorn populations. Captive breeding areas were established in 2003 within the refuge but there has been no data released as to the success of these areas. The captive breeding areas are fenced off from predators and provide a source of drinking water and several irrigated areas. These irrigated areas simulate rainfall during a wetter then average year. This makes these areas less like the pronghorns' natural habitat and more similar to captivity. This strategy may work for the short-term rapid re-growth of the population but fails to establish a long-term management system for the Sonoran pronghorn population. I believe the USFWS needs to implement a long-term strategy.

I believe you need to include the Exotics/Invasive Species Control Measures in the Final Decision. The refuge needs to continue removing newly found populations of exotic fountain grass by hand. The refuge needs to implement a program of inspecting vehicles, equipment and clothing for any seeds or plant matter prior to entering the refuge in order to limit the spread of exotic plants. The refuge needs to establish a plant nursery in non-wilderness for revegetation and encourage the land managers to only collect seeds from the refuge for the revegetation nursery. (Alternative 3).

Sincerely,

Peter Bengtson

Peter Bengtson
1280 E. Paseo Pavon
Tucson, AZ 85718

8/10

THE LAW OFFICES
OF
GIL VENABLE
714 East Ross Lane, Suite 100
Phoenix, Arizona 85014-1935
(602) 230-2778
Fax (602) 230-2878
E-mail: gilvenable@azbar.org
Of Counsel to Bruce A. Barton, P.C.

July 26, 2005

John Slown, Division of Planning
NWRS R-2
U.S. Fish & Wildlife Service
PO Box # 1306
Albuquerque, NM 87120

Fax: (505) 248-6874

Re: Cabeza Prieta National Wildlife Refuge
Comment on the Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan

Dear Mr. Slown,

I have visited and hiked in the Cabeza Prieta National Wildlife Refuge, but only in the winter. I am a former professor of environmental and natural resources law at Arizona State University, but these views do not necessarily reflect the policies of A.S.U.

The management direction of this land should be as wilderness and wildlife refuge, with particular emphasis on the endangered Sonoran pronghorn.

I have given some consideration to the pros and cons of the artificial water sources and seen the bones of wild animals scattered densely around the artificial water holes. I do not believe that these water sources are consistent with the natural ecosystem or the long term survival of animals, such as the pronghorn, which are adapted to this environment. The artificial water holes should be phased out, with study of the effects on vegetation and predator and prey populations, as the phase out progresses. What happens to forage for pronghorn and predation rates on pronghorn?

The captive breeding areas for pronghorn, fenced off from predators with artificial drinking water and irrigated areas may produce numbers in the short-term, but they are unlikely to produce pronghorn adapted to the Cabeza Prieta. A long-term strategy is needed. I encourage the funding of further scientific research. Please include initial results of the captive breeding program for pronghorn in the Final Environmental Impact Statement.

Cooperation with border enforcement agencies is important to reduce border traffic funneled into the refuge by increased border enforcement activities in other parts of the US-Mexico border. But noisy and disruptive activities like low air flights are harmful to the pronghorn and should be excluded. Motorized patrols should be restricted to the Camino del Diablo road and impacts should be minimized. Off-road vehicle activity, whether by law enforcement or by illegal civilian use, is highly damaging and should be strictly prohibited. I support the closure of the administrative roads in wilderness.

Cattle trespassing into the refuge remains a problem not only for direct impacts such as consumption of existing vegetation, but also for spreading invasive/exotic vegetation. The introduction of domestic livestock also poses a risk of disease transmission to native species as has been occurring with our bighorn sheep. In my experience, cooperation with the Tohono O'odham Nation, Mexican grazers and other neighbors is likely to be more effective than direct enforcement in limiting the number of stray cattle or other domestic animals that wander into the refuge.

At least in the winter, I envy you and the U.S. Fish & Wildlife Service the privilege of working to protect this wonderful land.

Sincerely,

Gil Venable

GV:lw

#11

John Slown, Division of Planning
NWRS R-2, USFWS
PO Box 1306
Albuquerque, NM 87120

7-27-05

Re: Draft Comprehensive Conservation Plan, Cabeza Prieta

Dear Mr. Slown,

In my opinion, the most effective management practice for the long range protection and preservation of the wilderness area is to prohibit or severely limit the penetration of this country by off road vehicles. I would recommend the closing of existing roads to the public, and leaving open only what is needed for the policing and entry for management activities.
I was born in and have lived in Yuma for 68 years. I have seen (and continue to see) the damage to the land, plants and animals caused by the off-roaders. Maybe education is part of the answer. Too many people and their kids think that it is a wholesome normal activity to go out and tear up the desert.
What is left of the public open spaces around our cities has been degraded in a big way, as you undoubtedly know. If we don't get this message out to the kids, and help them understand it, the wilderness areas will be next.

Thanks for your help,

Dirk Frauenfelder
12164 E. Del Norte
Yuma, AZ 85367

#12

Yuma Valley Rod & Gun Club, Inc.

ORGANIZED 1936

69 Years of Sportsmanship

INCORPORATED 1938

POST OFFICE BOX 10450 • YUMA, ARIZONA 85366
www.yvrgc.com

July 28, 2005

Mr. John Slown, Region 2 Biologist / Planner
United States Fish and Wildlife Service
Division of Refuges and Wildlife
Post Office Box 1306
Albuquerque, NM 87103

RE: Proposed Alternative Relating To The Comprehensive Conservation Plan (CCP) For The Cabeza Prieta National Wildlife Refuge (CPNWR)

Dear John,

On behalf of the Yuma Valley Rod and Gun Club (YVRGC), I am providing the following statement(s) pertaining to the CCP for CPNWR. As always, the YVRGC appreciates the opportunity afforded us by the United States Fish and Wildlife Service (FWS) to assist in the final attempt to determine how the CPNWR will be managed for the next fifteen years.

Our organization firmly believes the FWS at the local and regional levels completely understands where our organization is coming from and appreciates our involvement in this process. Although we will always have concern with Wilderness as it relates to wildlife management, wildlife-dependent outdoor recreation, and public vehicular access, the YVRGC sincerely appreciates FWS attempts to resolve these concerns. The following are important issues that we believe should be included in the Final CCP.

1) Wheeled game carrier issue
The YVRGC does not agree with other agencies' policies which include game carriers in their definition of "mechanical transport". We believe that the intent of Congress and the statutory construction of this section of the Wilderness Act was to restrict the transportation of people via means of "mechanical transport" and not materials or downed game. Therefore, the FWS should allow the use of wheeled game carriers within National Wildlife Refuge Wilderness during legal hunting seasons on any refuge, including CPNWR.

The Yuma Valley Rod & Gun Club, Inc. Mission Includes, But Is Not Limited To:

The conservation of wildlife, habitat and natural resources, education of the public and members to include conservation issues and firearms safety. To support and defend the second amendment of the United States Constitution, provide recreation and organized activities to members and the public and participate in charitable and other community service activities especially those related to conservation and sportsmanship.

2) Expansion of hunting opportunity
FWS indicating the expansion of hunting opportunity will only occur after determination of Sonoran Pronghorn population stability raises concern to our organization. The YVRGC believes the FWS has not demonstrated that hunting small game, deer, and predators (which will occur under very controlled conditions) will adversely impact pronghorn population stability. These public uses should be allowed just as all other allowable public uses will, except from March 15th to July 15th

3) Public vehicular access
The proposed alternative regarding Motorized Access in Non-Wilderness on page 130 of the matrix, indicates *"on center 30 m (100ft) of road corridors"*. We firmly believe 60 m (200') on center of road corridors is more appropriate and would be consistent with allowances on Kofa National Wildlife Refuge. Additionally, although it was not specifically addressed, it is our understanding that some administrative roads have or will be improved for the enhancement of enforcement capabilities. It is our firm belief that utilization of these improved roads by the public from September through February would be justified as it would decrease impacts associated with public use which currently only occurs on three basic routes (Camino Del Diablo, Christmas Tree Pass, and the Charlie Bell Road). Enhancement of enforcement capabilities may very likely increase, should this allowance occur.

4) Camping
There are two changes that the YVRGC firmly believes should occur. We believe Alternative 5 under the heading of "Wilderness Recreation" and "Camping" should be the proposed action(s) as presented in the matrix on page(s) 129 and 131 respectively.

Respectfully,

Jim Ammons, President

#13

Dear Sir,

I am in favor of anything you plan. I think you're doing a great job there & any place in the states.

I try to visit any preserve I can & to educate my family.

Sincerely
Janet McEwen

John C. Steffens
5109 N. Moonstone Dr.
Tucson, AZ 85750-9645
(520) 749-9165
July 30, 2005
John Slown, AICP
P.O. Box 1306
Albuquerque, NM 87103
Re: Cabeza Prieta NWR Plans
Dear John;
I was at the comment meeting held in Tucson on Monday, July 25. I was the first speaker during the formal comment session. I am writing this to reiterate some of the points that I made and add some additional thoughts that occurred to me since.
1. The extreme alternatives (doing nothing and doing way too much) should not be significant candidates for inclusion in the final plan. I am not a representative of any group other than a few people that I visit CPNWR with once or twice a year.
I don't have any particular insights into the specific preservation methodologies or plans for the area. I do however believe that maintaining the wilderness characteristics and designation of the area is important. I would not like to see CPNWR turn into another National Park with thousands of visitors each year.
2. I believe that it is vitally important to include the Goldwater (Stump) Range in mind when assessing the impacts to CPNWR. Those governmental agencies that are responsible for administration of the Range (the Marines on the West and the Air Force on the East) should be part of the permit process. Other governmental agencies that need to have a role in the future of CPNWR and BMGR include the Department of Homeland Security, the Bureau of Land Management, and Arizona Game and Fish. All of these (and maybe others) should be participants in providing input and agreement to the final plan.
3. The Visitor Permit process, in the past, and more so now, has become disjointed. I think that significant improvements could be made with a minimum of overall expense to the U.S. Government. Currently, there are three paths whereby a Visitor Permit might be obtained. The Marine Corps process seems to be the quickest and the Air Force process seems to be the most confused. The CPNWR process is somewhere in between. Since a significant part of access to CPNWR requires travel through BMGR, those agencies must be involved. My thoughts are:

1. One agency, most logically CPNWR, should have primary responsibility for issuing Visitor Permits.
2. There should be two types of physical Visitor Permits issued. The first that visitors should apply for would be individual permits. The second should be specific group access permits.
3. Individual permits should be able to be requested and printed by the visitors on-line in addition to by mail or in person. The application should include submission of the hold-harmless agreements. These applications would individually identify the person making the request, the vehicle for which the request is made, and returning the hold-harmless to the issuing agency (CPNWR). Since the hold-harmless must be signed, it would have to be mailed in to the issuer. The requester should then be able to print (or receive by mail) the actual permit. There should be one for the individual and one for the vehicle. These would be instead of the current business card permits. The individual permit should be kept with the person and the vehicle one with the vehicle. These permits should be valid for at least one year and perhaps a many as five years.
4. When an individual or group desires to actually access BMGR/CPNWR, and additional submission should be made for that trip. The trip leader should have to apply with the individual permit numbers of all people and vehicles on the trip. This would better allow control over group sizes. The request should include the dates (start and finish) of the trip. The routes planned for ingress and egress, and the locations of all proposed overnight stays. When the trip permit is granted, the issuer should mail an 8½x11 sheet of paper to the requester for each vehicle. This paper must be displayed in the passenger side front window and should be a different color each year (or month). This would allow the DHS helicopters to readily verify that the vehicle is authorized. Groups of visitors should be discouraged from traveling together as it just increases the damage and congestion.
5. Law enforcement and other authorized personnel on BMGR/CPNWR should be able to verify that the group or individual is legally in the area by comparing the individual permits with the trip permit and the color for the year (or month).
6. The current rules and requirements, (for fires, cleanup, use of roads, vehicles, etc.) as on the CPNWR web site are appropriate and should be maintained, except as noted below.

4. Groups should be limited in size to something that the ranges and campsites can accommodate. I would guess at no more than 5 vehicles and no more than 12 people, whichever is larger.
5. Horses or other animals should not be permitted except by authorized governmental agencies so that assurance could be had that no nonnative seeds are spread on the range(s). The user of the animal should be responsible for leave-no-trace. ATV's (and dune-buggies) should only be authorized like horses — no non-governmental group or individual should be permitted to have them on the ranges. Every place that I have gone where either ATV's or dune-buggies, or sand-rails were permitted, the desert has been destroyed.
6. With the increasing number of UDA's (illegal aliens) encroaching on the ranges, it becomes increasingly important for a means to allow the legal, authorized individual to protect themselves. Those who are not government agents performing their duties should be permitted to carry personal protection firearms under either of two conditions: 1) that they carry a valid Concealed Weapons Permit issued or recognized by the State of Arizona, or 2) that they carry a valid Arizona Hunting License and that it is a valid hunting season where they are located.
7. Please make an effort to persuade the Sonoran Pronghorn to shift their fawning to two weeks later so that the closures around Tule Well would not begin until April 1. (An alternative would be to allow the northern route from Christmas Pass to Tule Well to remain open until April 1.)
Thanks again for the plan and the opportunity to put in my 2¢ about CPNWR/BMGR. I really enjoy visiting to hike, take pictures, and just enjoy the serenity of the wilderness. I will try to drop by the FWS office in Albuquerque when I am there in late March of next year.
John C. Steffens

RB

THE CAMP FIRE CLUB OF AMERICA

THE COMMITTEE ON CONSERVATION
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230 CAMP FIRE ROAD, CHAPPAQUA, N.Y. 10514
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John Slown, Biologist / Conservation Planner
Division of Planning, NWRS R-2
U.S. Fish and Wildlife Service, P.O. Box 1306
Albuquerque, NM 87120

Dear Mr. Slown,

The draft Comprehensive Conservation Plan, the draft Wilderness Stewardship Plan and the draft Environmental Impact Statement for the Cabeza Prieta National Wildlife Refuge have been received and reviewed. Before commenting on the plans, I would like to express my gratitude for the excellent draft, scoping and management alternatives presented to the public for its review and comment.

Alternative #4 appears to be the most acceptable and beneficial of all five alternatives. Although a goal of 950 to 1200 sheep population in Alternative #5 is attractive, there are serious problems to be faced under this alternative. Problems include the development of additional water and forage enhancements for desert bighorn sheep in wilderness areas.

In an article written by Bill Broyles for the Wildlife Society Bulletin Volume 23, Number 4, titled, "Desert Wildlife Water Developments: Questioning Use in the Southwest". Broyles goes on to say, " For nearly sixty years to increase wildlife populations and to extend their ranges, managers have increased the quantity and distribution of available water by developing new waterholes and enhancing existing ones. In the Cabeza Prieta National Wildlife Refuge and the western portion of the Barry M. Goldwater Air Force Range in southwestern Arizona, managers have increased the number of waterholes in bighorn sheep habitat by 33 percent and the maximum quantity of water by 364 percent. However, a review of file and technical literature for that region reveals that the effects of these changes remain largely unstudied. It has not been shown that these developments are necessary, beneficial or without harmful side effects".

While it is understood that high density populations of American pronghorn are associated with abundant drinking water, while low densities exist in semi-arid regions and deserts with little water. The use of free-standing water by Sonoran pronghorn is not clearly understood. Sonoran pronghorn have evolved using little or no water except in extreme drought conditions. It has been suggested that Sonoran pronghorn do not require free water and never drink, apparently meeting their moisture requirements from metabolic water and pre-formed water in their diet. Caution is therefore urged in the extensive water developments under Alternative #5. A better solution is under Alternative #4, where it is suggested the development of additional waters is possible should research validate the need.

It is understood that the role of the Cabeza Prieta Wildlife Refuge is the recovery and protection of rare and sensitive species such as the desert bighorn and the federally endangered Sonoran pronghorn as well as the conservation of a diversity of desert wildlife within the Sonoran Desert. It is, therefore, a concern when it is noted in the plan for Alternative #5 that," If 75 percent of a goal of 900 to 1200 refuge sheep population is not achieved within 15 years, the refuge will seek off-site stock for stocking refuge mountain ranges".

These desert bighorn sheep have over thousands of years become adapted to desert conditions. To bring in off-site stock for stocking will genetically contaminate the existing rare and sensitive species. This must be avoided to remain in compliance with the Organic Act for the National Wildlife Refuge System, which states, "Each refuge shall be managed in a manner that maintains the biological integrity, diversity and environmental health of the refuge system".

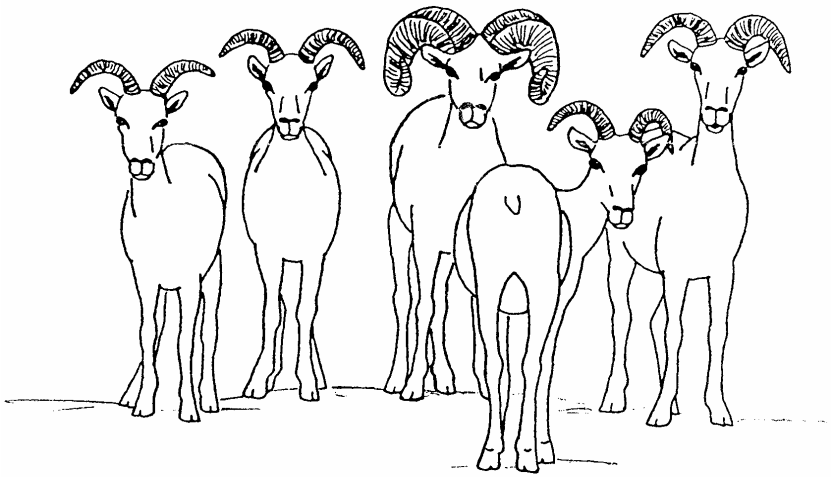
Other problems arise with recreationists in the refuge under Alternative #5. As an example, no part size or length of stay restrictions exist and pack/saddle stock are allowed in with the general entry permit. In the Adirondack Park in New York State, the lack of regulations in the number of day use groups, over-night camping groups and the use of designated camping sites caused problems of over-use. In the Unit Management Plan for the High Peaks Wilderness Complex in the Adirondack Park, rules and regulations had to be placed to limit over-use in that area. It would be wise to have such rules and regulations in place in the Cabeza Prieta Refuge should they be needed.

Alternative #4 is the best choice of the five alternative plans. Thank you for allowing me this opportunity to comment on the plan for the Cabeza Prieta Wildlife Refuge. To you personally, let me extend my best wishes for the success of your efforts.

Sincerely,

Peter Roemer
Deputy Chair (Hon) Conservation Committee
Camp Fire Club of America

July 27, 2005



Friends of Cabeza Prieta

P.O. Box 64940, Tucson, Arizona 85728-4940 Email: FoCabeza@aol.com

14 September 2005

Mr. Roger DiRosa
Refuge Manager
Cabeza Prieta National Wildlife Refuge
1611 North Second Avenue
Ajo, Arizona 85321

Mr. John Slown
Planning Department
USFWS
PO Box 1306
Albuquerque, New Mexico 87103

Dear Mr. DiRosa, Mr. Slown, and Fish & Wildlife Service,

On behalf of the Friends of Cabeza Prieta and wilderness and wildlife enthusiasts nationwide, we are pleased to have this opportunity to add our comments to the Fish and Wildlife Service's 2005 Comprehensive Conservation Plan for the Cabeza Prieta National Wildlife Refuge and Wilderness. We begin these remarks with the conviction that this refuge is an exceptional, irreplaceable resource, unique on our planet.

In the words of Carl Lumholtz who visited the western refuge in 1910-1911, "Fond as I am of civilized life and all it implies…, I could not help longing for the fresh, cool, beautiful, and silent nights of my wild desert" (New Trails in Mexico:343). Other writers such as Charles Bowden, Edward Abbey, Ann Zwinger, Charles Sheldon, Doug Peacock, and John Annerino have spoken eloquently about the magnificence of the refuge. With good reason, many people love the refuge.

This plan is proposed to guide the refuge through the next 25 years. If we look back 25 years to1980 we can see profound changes in the refuge—Wilderness, more visitors enjoying the desert, designations of endangered species, and a host of unforeseen problems. Now we're being asked to look ahead to 2030.

The plan must look beyond today, to a day when the border problems have subsided, when the population of Arizona reaches 15 million and neighboring states have swelled to triple their sizes, when regional opportunities to camp and hike have dwindled, and the character of the landscape itself may be changing.

With due respect to specific points in the five management alternatives, we need a plan with vision, flexibility, and rigor:

the vision to maintain this grand desert and its fascinating wildlife, the flexibility to monitor and respond to changes, and the rigor to uphold the highest standards of ecosystem management and Wilderness preservation. The plan must look at the fullest range of values of this land: wildlife, scenery, science, recreation, habitat, watershed, culture and history. The plan must gauge human uses by their sustainability over future decades and by their least effect on natural processes and wild conditions. When it is time for the next plan, in 2030, the refuge will be in its ninth decade. We need a plan that cares for the refuge such that we and our predecessors—the Lumholtzes, the Sheldons, the Monsons--- would both recognize the land and be proud to visit here.

Through wise selection and implementation of the management alternatives, the refuge will live. With poor choices, it may lose its soul. We are optimistic that the refuge staff and Fish & Wildlife Service will choose wisely

GENERAL COMMENTS:

In recent years people have not been kind to the refuge. Range fires, mashed plants, erosive roads, trash, harried wildlife, vandalism, uncontrolled livestock, runaway weeds, helter-skelter driving, sonic booms, wide-swath campsites, a warming climate, junk-yard cars: these all are abuses to a grand land and an imposition on wildlife and their home. We prefer to let natural processes run the refuge, but to promptly correct the human caused problems, nature needs a human hand. Here FWS can—and must---shine. And FWS must consider the cumulative effects of these problems. The staff's spirit of conservation that has shone so brightly in the past few years should be written into the plan's policies so that future managers can continue the work.

FWS should be addressing the recovery of not just Sonoran pronghorn, but the recovery of the refuge from the onslaught people and their carelessness. Reclamation, re-vegetation, and re-landscaping of disturbed and degraded areas of human activities will be needed in many spots around the refuge. We urge the refuge to launch immediately a reclamation study with sample plots and techniques in order to develop a full strategy for re-naturing larger areas when border problems calm down. Remove trash, abandoned vehicles, and tow darts. Minimize the effects of humans. We support the recommendations in the 1999 Wildlands Project report called "Rewilding the Sonoran Desert," by Dale S. Turner. We also support the work and recommendations of the Wilderness Society, Wilderness Watch, Defenders of Wildlife, the Arizona Wilderness Coalition, and the Wildlands Project.

Recovery of the refuge should be a guiding principle of this plan along with protection from further damage. FWS must include an actual plan and budget for recovery of damage and impacts to ecological, aesthetic, historical, cultural, economic, or social values of the refuge, whether direct or indirect, singular or cumulative.

We appreciate the planning document. It's much better than most and tries to justify alternatives with reason and facts. The color photos make it much friendlier.

CULTURAL RESOURCES

The plan should include a far fuller look at archaeology, Native American presence, and Spanish-European history. In particular, a number of significant sites need to be surveyed and appropriate protection should follow. Because the refuge is a fragile-pattern area, its artifacts, trails, and sites are vulnerable. Trails should be mapped; sites catalogued; biographies of non-indigenous pioneers such as Dan Drift, Jim Havins, and Angel

Monreal should be elicited and collected. The refuge's human history needs it be put in its larger context, with big picture questions such as when and how did the successive cultures arrive, what groups and alliances used what is now the refuge, how did climate affect people living here and how did it affect wildlife and habitat? We applaud the publication of the CPNWR Cultural Resources Overview and Assessment (2001).

The plan should endorse writing and publishing the refuge's administrative history in book form or on its website. If called for in the plan, it may someday get done; if omitted, it'll never happen. A refuge needs a sense of its own history, and the chronicle of this refuge will be interesting to the public, too.

WATER DEVELOPMENTS

The subject of game waters has unfortunately become contentious. We support Wilderness driven by natural process and without human developments. We also value bighorn sheep---seeing one is the highlight of any hiker's or hunter's visit. However, we are quite unconvinced that game waters work. The science tells a very confused story of effectiveness. The one study done on the refuge itself (Broyles and Cutler 1999) showed no benefit on a population level for bighorn productivity, recruitment, or density. Most revealing are the comments by water proponents softening their claims that water increases populations, and instead supporting water developments as ways to cushion populations in times of drought (Rosenstock 1999). CPNWR managers are well aware of the points and counterpoints in this discussion. We note that your review did not cite the work done on the refuge in coordination with FWS by Hughes, by Cutler, and by Broyles & Cutler; we suspect that they were omitted because they differed with the dogma of a state agency, but under NEPA real scientific discussions include all relevant studies, including opposing viewpoints, and are required by law. Any final EIS must not only acknowledge these studies but must explain why FWS gives more weight to some studies.

Despite major doubts, some are calling for even more game waters on the refuge. However, they provide no new reasons or information. Before we are convinced, a number of major questions will need to be answered, including if waters do work, then why do we see bighorn population swings (e.g. as shown at table 3.4)? What are the population trends for neighboring populations outside Wilderness and for areas where proponents deem that the number and distribution of waterholes is adequate (such as Kofa NWR)? A current cause-effect study on the refuge will shed further light on this topic, but it may not be finished for another decade.

There is evidence that surface water is neither a necessary nor a sufficient condition for the subsistence and perpetuation of most desert wildlife, not even for javelina, Sonoran pronghorn, mule deer, and desert bighorn sheep. Despite Morgart (2005), four studies of Sonoran pronghorn (Monson 1968; Hughes and Smith 1990; Thompson-Olais 1993; Cutler and Morrison 1995) have failed to show their need for water. The unfortunate deaths of pronghorn fawns during 2005 in the Childs Valley enclosure also lends evidence that water is not a sufficient condition for their survival. Javelina range independently of water in the study area, and can survive without water by subsisting on succulents such as prickly pear cactus (Ockenfels and Day 1990). Opinion is mixed on mule deer requirements for water. Anderson (1949:48) states "Surface or free water apparently is not required by the mule deer," and contends that vegetation supplies sufficient moisture. Krausman and Ables (1981) report mule deer herds in ranges lacking water, and Swank (1965) nominates food as the primary factor in controlling mule deer populations.

But it is the desert bighorn, that totem symbol of water development, which most clearly focuses the issue. Some bighorn do not seek available water even in summer (e.g. Russo 1956, Simmons 1969a). There are significantly fewer numbers of bighorn seen during summer waterhole observations than the number known to inhabit the mountain range around the waterhole (Russo 1952 and 1956; CPNWR Annual Waterhole Count files; AGFD Fall Population Surveys files). One study declares, "Bighorn sheep were not attracted to water catchments. Data suggest that the additional water was not important to the deer or sheep populations" (Krausman and Etchberger 1995:292). Even as early as 1936, Aldo Leopold (1936:296) concluded "the desert races of mountain sheep are much like mule deer and antelope: they drink periodically when they can, but they subsist and reproduce on succulence alone where occasion requires."

In the CPNWR bighorn waters in the Growler Mountains usually dry before June, but the range supports an estimated 110 bighorn (1993 AGFD/USFWS Survey, CPNWR files). An estimated 59 bighorn have home ranges in the Granite Mountains, which did not have a reliable waterhole for the decade prior to 1994 (CPNWR files). The Bryan Mountains and Sierra Arida mountains lack even intermittent water, but have established populations, whereas some areas with ample water (e.g. Drift Hills, Buck Mountains) have small or transitory populations. AGFD/USFWS bighorn population surveys of CPNWR have recorded an increase from 116 observed in 1986 to 269 in 1993, but this increase was not accompanied by any increase in water availability (CPNWR Annual Reports). AGFD estimates of this population rose from 311 (1986) to 549 (1993).

The benefit of water to the Childs Mountain population is not at all obvious, considering population numbers. Perhaps Childs Mountain would be a suitable site outside of Wilderness to assess the use and need of water by bighorn as well as their response to additional water guzzlers. Childs Mountain should also be studied for the effects of human activity and structures on bighorn. This herd seems to be forgotten in most CPNWR discussions.

Some desert mountain ranges outside the study area-- such as the Sierra Seri and Sierra Bacha in Sonora, Mexico (Mendoza 1976, Turner and Weaver 1980), the Big Hatchet Mountains of New Mexico (Watts 1979), and the Little Harquahala Mountains of Arizona (Alderman et al. 1989)-- historically have supported bighorn populations but have lacked surface water for part, much, or all of the year (Krausman 1985; Smith and Krausman 1988; J. Hervert, AGFD, pers. comm.). Lee (1993b:19) remarks, "While the United States has been involved in a massive water development program for the last 30 years, Mexico's sheep population seems to be doing exceedingly well without such a program." Densities in these Sonoran Desert ranges parallel or exceed those in Arizona's watered ranges (Lee 1993a, Lee and Lopez-Saavedra 1994).

At other times, bighorn bands survive in mountain ranges beset by protracted drought. May (1973:100) reports that from April through mid-August 1971 "all known tinajas within the Pinacate region [of Mexico] were dry...." A summer 1946 CPNWR file report notes that Tinajas Altas were all dry at the end of June amid a "severe drought which was broken in mid-July. [But] no known deaths of sheep from lack of water occurred." Other citations of bighorn living through periods well beyond their expected drinking cycles (3-5 days) in hot weather and drought include Monson (1958b), Simmons (1969a and 1969b), Krausman et al. (1985), and Sitko (1993). These cases indicate that drinking water is not a necessary condition for desert bighorn.

The literature describes no direct evidence of desert bighorn dying of thirst. One compilation of 141 bighorn mortalities lists only 8 known natural deaths which might be attributable to non-injury causation such as disease and thirst, but enumerates 17 deaths by drowning in canals and ditches, and 28 deaths by collisions with vehicles (Welsh 1971, cf. Cunningham and deVos 1992). Bryan (1925) notes cases of bighorn drowning in waterholes. Cases of bighorn dying near waterholes are about evenly divided between sites with and sites without ample water (pers. obs.). We await the analysis of a mass die-off of 22 desert bighorn in Nevada summer, 2005; early results did not rule out blue-green algae, botulism, or dehydration.

Blue-green algae (cyanobacteria) in fresh water ponds presents a toxic threat to wildlife. Carmichael (1994:80) warns that "thirsty animals are often undeterred by the foul smell and taste of contaminated water," yet they die immediately with no apparent cause. This may be responsible for occasional, sudden, unexplained local mortalities of bighorn and deer in CPNWR and BMGAFR (Monson 1965; Witham et al. 1982; deVos and Clarkson 1990; Mouton et al. 1991; CPNWR Narrative Report 1970, CPNWR file). A case of botulism caused by polluted water in the Old Dad Mountains of California has also been widely discussed. It remains to be determined if these cases of bighorn mortalities at or near waterholes are attributable to behavior (old, injured, thirsty, or ill animals lingering near water) or to the deleterious effects of unhealthy water consumed by animals.

Krausman and Leopold (1986a:507) report that in an Arizona desert mountain range outside CPNWR, "water was more abundant in areas without sheep [suggesting] water is not a limiting factor to bighorn sheep in the Harquahala Mountains." In some desert bighorn habitat, the presence of water has not proven sufficient to prevent the collapse of the bighorn population. These include well-watered Arizona herds in Aravaipa Canyon (Mouton et al. 1991) and on Pusch Ridge in the Catalina Mountains (Krausman 1993; Heffelfinger 1994). Therefore, water by itself is not a sufficient condition insuring the presence of bighorn in desert ranges.

Apparently bighorn do not move far to find water. Some biologists and managers speculated that historically CPNWR's herds responded to drought by migrating or drifting southward into the Pinacate region of Sonora, Mexico or northward to the Gila River (Nichol 1937a, Allison 1939a and 1939b). Buechner (1960:147) states, "Presumably, the more mesic mountains of Mexico are essential to the survival of at least part of these [CPNWR] sheep." However, subsequent CPNWR information dismisses the migration theory (CPNWR summer 1946 narrative report, CPNWR files of summer waterhole counts). Movement and possible migration by sheep in this study area are discussed in deVos et al. (1988) and Scott et al. (1990), but they noted no large-scale movement. There are no studies or observations here showing mass exodus of bighorn, Sonoran pronghorn, or mule deer herds from a drying waterhole to wet ones either within a mountain range or between ranges. In a Nevada study, Leslie and Douglas (1979) tout the importance of developing permanent waters for bighorn displaced by human encroachment. However, they note that some bighorn continued to migrate seasonally despite waters developed to hold them. Unrecorded in their study are the extent, volume, and duration of natural water sources (tinajas and seeps) available to their bighorn. Contrary to the CCP, Leslie and Douglas do not document a causal correlation between water developments and bighorn population, and they even note a decrease of the estimated population from 278 to 217 in 1976 despite the additional waterholes (page 20). Their population trends were taken from waterhole counts, aerial surveys, and random observations (page 18).

Further, on a larger scale, any short- and long-term changes in climate itself will greatly influence the effectiveness of developed waters. Revelle and Waggoner (1983; 1990) calculate that either a 10% decrease in precipitation or a 2°C increase in temperature will cause a 30% decrease in run-off. Such a decline would seriously alter the amount of water available in the CPNWR and presumably the amount and quality of forage. Whether global warming will increase or decrease precipitation in CPNWR remains to be seen. Many waterholes were designed and built during "the years 1956-71, [which] constituted an abnormally stable period in terms of temperature and precipitation fluctuations (Dracup 1987)," but recent fluctuations of El Niño and the Southern Oscillation show that climate does not remain stable (Waggoner 1990). Betancourt (USGS, pers. comm.) reports that trends in wildlife populations roughly parallel the spikes and valleys of El Niño and the Southern Oscillation Index. In a climate with more frequent and wider precipitation fluctuations, managers might need to revise their criteria for waterholes, and they can be expected to take this prospect as incentive to construct more waterholes in order to subsidize wildlife in times of drought. Fischer (1991:14) wrote that weather, as described by the Palmer Drought Severity Index, “may be the driving force in [bighorn] population fluctuation in the Hatchet Mountains [of New Mexico].”

But, installation of new waters should be weighed carefully (Burkett and Thompson 1994). Smith and Krausman (1988:4-5) recommend, "Before adding water in [bighorn] sheep habitat, the need for water should be established. If annual plant biomass has been measured and is adequate (suggesting that food is not a limiting factor), water should be supplied temporarily in mobile tanks before building more permanent water developments." Sanchez and Haderlie (1990) warn that overly eager water development could overpopulate some species and thereby threaten range conditions, as well as upset population dynamics and traditional habitat usage. We note that Sanchez wrote this while a biologist at CPNWR and Haderlie while manager of Kofa NWR.

To assess the success and merit of these water developments, further work is needed to correlate water development with growth of bighorn populations and expansions of their ranges. That work may also proscribe the maximal range carrying capacity of the study area, or may reinforce the concept that carrying capacity is the current population unless limiting factors can be clearly defined and proven (cf. Macnab 1985). This would restrain predictions that bighorn populations can continue to increase with the addition of more water and would curtail arbitrarily high management goals for bighorn density. (For example, when bighorn herds in Yuma County, Arizona, didn't increase rapidly after the control of poaching and the installation of a few developed waterholes, one disappointed observer was moved to postulate ad hoc that inbreeding must be inhibiting the expected growth of herds [Kaughphy 1946].)

In a study near CPNWR, Krausman and Etchberger (1993 and 1995) conclude that the additional water was irrelevant to resident deer and bighorn. McCarty and Bailey (1994:18) caution, "Biologists should not presume that water is a limiting factor for desert bighorn everywhere...."

deVos and Clarkson (1990:157-158) caution, "Although development of water sources represents a major commitment of both funds and labor, much of the literature fails to prove a cause and effect relationship between additional water sources and increased wildlife populations."

Work needs to be done to sort out competing causal-hypotheses about assumed or apparent increases in bighorn populations, increases which themselves have yet to be thoroughly

substantiated. These four causes include at least 1)livestock removal, 2)control of human infringement, 3)water development, and 4)effects of climatic change on range condition. Each stands in need of definitive proof, if indeed they are extricable. Each hypothesis implies differing and sometimes contradicting management emphases.

The first thesis holds that any rises in bighorn populations in this study area were caused mainly by the removal of livestock, which competed for resources and transmitted diseases (e.g. Russo 1956, Carmony and Brown 1993:193-204). The second argues that bighorn increase is due to active management by agencies in curbing poachers, controlling human disturbance, and reducing predation of sheep (e.g. Nichol 1937b, Russo 1956 and 1965).

Alternative 5 is based on a hypothesis espoused by some management agencies (AGFD) and auxiliaries (ADBSS) and contends that increases of populations are attributable primarily to water development. The bulk of studies showing a cause-effect relationship between water development and animal increases focus on deer (e.g. Elder 1956, Hervert 1985, Hervert and Krausman 1986, deVos and Clarkson 1990). However, Krausman and Etchberger (1993 and 1995) discount the effects of developed waters. In their study of vegetation quality ranges for desert mule deer and bighorn along the Hayden-Rhodes Aqueduct, they found that the deer population is close to the carrying capacity of available nutrients and that additional waterholes in that area would not be effective. Further, "We did not detect any positive influence of the added water [catchments] on productivity of mountain sheep in the Little Harquahala Mountains; survival decreased (Krausman and Etchberger 1993:150-151)." A causal connection between added water guzzlers and population increases has not been established in the scientific literature.

As Smith and Krausman (1988:4) remind us, "Sheep may have existed on such ranges for thousands of years without free water and, although densities are low, their number may be within the constraints of available resources." In CPNWR the AGFD (deVos et al. 1988; Remington 1988; Remington 1989) reported a density of 0.16 bighorn/km^2 in their whole range (compared to 0.21 sheep/km^2 in all southwestern Arizona bighorn range) and 0.36 bighorn/km^2 in their preferred habitat here (compared with 0.42 sheep/km^2 in all southwestern Arizona). Further review is needed to correlate bighorn densities with specific perennial waterholes and with specific mountain ranges.

A more likely hypothesis asserts that changing climate and weather cycles control range forage which, in turn, determine bighorn population increases and decreases. For example, Fisher (1991:14) writes that weather, as described by the Palmer Drought Severity Index, "may be the driving force in population fluctuation in the Hatchet [Mountains of New Mexico]." Some researchers believe that bighorn population increases are due to increased vegetation and improved range condition (Browning and Monson 1980; Krausman et al. 1985; Krausman and Leopold 1986; Warrick and Krausman 1989; Dodd 1989). Vegetation in CPNWR may provide more succulent moisture for bighorn than it does in other areas, e.g. Death Valley in the Mojave Desert (Welles and Welles 1961, Douglas 1988) or the River Mountains, Nevada (Leslie and Douglas 1979), thereby lessening bighorn reliance on surface water. Baseline information on range condition and productivity in the study area is beginning (Hughes and Smith 1990; two AGFD/USFWS vegetation studies that we haven't yet seen in print). The work of Krausman et al. (1989) explores similar habitat.

Yet to be determined is the vegetative carrying capacity of wildlife habitat in CPNWR, and this is not in the CCP. The work of Krausman and associates in Arizona (e.g. Krausman et al. 1985; Krausman and Leopold 1986a; Krausman and Etchberger 1993) indicates that for bighorn and mule deer the type and quality of vegetation will be a far more significant factor than developed waters.

Water guzzlers affect other wildlife. The range of affected species includes those discussed in MacKay et al. (1990), Loring et al. (1988), Kubly (1992), Burkett and Thompson (1994), and Cutler and Morrison (1995), but the actual effects—beneficial, neutral, or negative-- are little understood.

Birds may incur diseases at waterholes. Both white-winged and mourning doves may be exposed to Trichomonas gallinae by drinking infected water at watering places. Shallow water pools contain organic matter, enabling the disease organisms to survive until ingested by a dove (Stabler 1947, Straus 1966, Fraser 1986). Large epizootics are possible, especially in mourning doves, and have occurred in Arizona (Straus 1966, Brown 1989). AGFD issues warnings to the general public that birdbaths and backyard waterers may harbor T. gallinae and pose a threat to doves concentrating around water, especially in summer (e.g. Anon. 1988; Lin Pries, Copper News 2005), yet the agency itself continues to develop similar waters without showing a qualitative or quantitative difference between developed waterholes in the field and those in backyards. Cottam and Trefethen (1968:220) warn that, "When virulent outbreaks [of T. gallinae] occur in the desert, stagnant waterholes or tanks used jointly by pigeons, mourning doves, and whitewings should be examined regularly, and, if contaminated, disinfected when practical." Due to the remoteness of desert waterholes and the daily presence of scavengers (foxes, coyotes, turkey vultures), even a large-scale die-off might persist undetected for some time. The potential effects of Trichomonas gallinae and other water-born diseases is not analyzed in the CCP.

And it remains to be explained in the CCP how the existing or proposed additional tanks in CPNWR will be monitored for diseases or sanitized if problems do arise.

When initiated, sited, designed, and built, the developed waters in this region were labelled "sheep tank" or "pronghorn water." Minimal consideration was given to present and potential impacts on other species. Evolving management philosophy now emphasizes species diversity, holistic integrity, and ecosystem management. Narrowly viewing CPNWR as the "Cabeza Prieta Game Ranch" (Russo 1965:18) no longer reflects current scientific thought or FWS policy.

Developed waterholes have extended the range and expanded the populations of other large and possibly competitive wild mammals (e.g. deer, javelina) into what was traditionally exclusive bighorn or pronghorn range (Thompson-Olais 1993). Too, the potential exists for drawing and holding trespass or feral livestock to developed waterholes, where livestock would pose competitive and pathogenic threats to bighorn. Unlike most natural tinajas which are relatively inaccessible to livestock, many developed waterholes are accessible by roads bladed for the construction process. Trespass cattle, horses, burros, and goats from Mexico do occasionally enter the study area (CPNWR files), and reportedly livestock from the Gila River agricultural corridor historically have drifted southward into the study area in times of lush vegetation following bountiful rains. Waterholes potentially constitute an attractive nuisance.

The Alderman et al. (1989) study confirms these concerns in a similar habitat area, the Little Harquahala Mountains of Arizona. In that range the vegetation has supported a low-density but stable population of bighorn without the "benefit" of any developed water. When surface water is developed, mule deer or wild burros may move in and compete with the bighorn for an already limited forage supply. Alderman et al. (1989:270) warned "the addition of water may be undesirable if it also attracts competing ungulates.... Efforts to improve habitats by adding water when water is not the limiting factors may only prove expensive and unsuccessful. When making decisions concerning water development, resource managers must give full consideration to the direct and indirect effects permanent water sources will have on the environment and the wildlife species being managed." Similar perspectives are given in Krausman et al. (1985) and Krausman and Leopold (1986b).

We mention all of this water science to show these points:
1. After 60 years of water development on the refuge, we still have no documentation that waterholes benefit bighorn population productivity, recruitment, or density. In fact, the Broyles & Cutler (1999) study shows no statistical difference for bighorn population productivity, recruitment, or density in refuge mountains having or not having perennial waterholes. This study was done specifically on CPNWR.

2. We still have no documentation showing that waterholes benefits or effects on other species. We hope that the pronghorn program will provide sufficient data to reasonably describe the role of waterholes for pronghorn.

3. Until the science is better understood, there are no valid biological reasons to build more waterholes within CPNWR. We urge adherence to the AGFD criteria of assessing each individual waterhole to determine if it should be enhanced, maintained, modified, or abandoned (AGFD White Paper 1997:50-54). It is unfortunate that the primary discussion about refuge management centers on waterholes when there is so much more to the refuge and effective management.

BIGHORN POPULATION QUOTAS

We find the proposed bighorn quotas audacious. We know of no literature showing that bighorn populations can be increased solely by the addition of water. Again, we note the lack of comparative numbers and the lack of information on other refuges or places that have set and met quotas. It would make equal sense to set quotas for the number of golden eagles, tortoises, ironwood trees, or Kearny sumacs. Remington's 1989 chapter "Population characteristics" states that "densities of bighorn within Arizona are similar to densities found throughout the range of the species" (page 84) and he cites several papers indicating that population size is a factor in reducing populations, in regulating recruitment, and in "leading to a major die-off" when carrying capacity was exceeded (page 84). Krausman, Sandoval, & Etchberger (1999:180-183) report that populations may be self-limiting through density-dependent mechanisms such as behavioral interactions. Using Remington's table 1 showing habitat area for bighorn, current and recent CPNWR populations fall well within expected numerical ranges; indeed, the proposed goal of 950-1200 would yield a fantastic and unlikely 3.6 bighorn per square mile or double any bighorn range in Arizona as of 1989, and sevenfold what the CPNWR sustained in 1989.

Put another way, K. D. Bristow (1996, 1998) describes a Sonoran Desert mountain range which is literally blanketed by perennial waterholes (13 sources for 227 km^2 with no bighorn habitat >5km from water). This range, the Silver Bell Mountains near Tucson, is comparable in many ways to ranges in CPNWR. However, the density of the estimated bighorn

population in the Silver Bells was 1.15/mi^2 in 1994 and 0.77/mi^2 in 1995, both pre-drought years, and significantly less than the stated but unrealistic quotas of Alternative 5.

We find little reason for the CCP conjecture that desert bighorn sheep before European contact "were likely more abundant and occurred in higher densities across the refuge than currently" (CCP: p. 179). First, the cases noted in Russo (1956:18-19) are outside CPNWR; second, the Russo cases give no indication of actual numbers or densities. Brown and Carmony (*Man and Wildlife in Arizona* 2001:182-183) note that between 1824 and1865, the early Arizona travelers "had relatively few encounters with bighorn sheep. Those incidents they did report contain no surprises regarding the historic distribution of this animal" and "indicate that bighorn sheep were always restricted in Arizona to mountains, cliffs, and canyons."

EVALUATING WATER GUZZLERS

We find no specific information on each existing or proposed guzzler site in the management plan. And we find no data showing a species level benefit for bighorn or other species. Visitation does not equate to either use or benefit.

Further, an adequate management plan should address the specific benefits and impacts of each water development and justify its merit and need. Each should be reviewed individually to ascertain if it should be enhanced, maintained, or abandoned. To do this several questions should be applied:

a. what's the particular biological purpose or need for *this* guzzler?
b. what species are you trying to help? how will it help them?
c. what's the history of this site? how many animals are already living in the area?
d. what other species might be affected? how so?
e. are there possible negative effects for wildlife or for other values of the land, e.g. Wilderness, recreation, scenery?
f. what are the options? build, modify, remove, leave it alone? Alternative sites? What will each option cost in time and money?
g. how will the guzzler be monitored so we'll know if it's successful or not?(AGFD White Paper 1997:50-54).

HUNTING

We recognize that bighorn hunting is appropriate in the refuge, but we reject the inordinate management emphasis on one huntable species—bighorn. Single-species management is not appropriate; in the 21st century ecosystem management is. Conversely, it is probably best to let AGFD set hunting permit numbers outside the management plan itself. Considering the sparse populations of other wildlife, the vagaries of climate and food plants, the slow reproduction rates of many game species, potential conflict with Sonoran pronghorn, and the immense enjoyment gained by visitors who see wildlife of all forms, we cannot support hunting other species at this time.

GUZZLER REDEVLOPMENT

We read with puzzled interest that redeveloping some current tanks will reduce the need to haul water. However, we remember that in the late 1980s and early 1990s Granite Pass Tank and Bassarisc Tank were rebuilt with the slogan that they'd be the ultimate, never-haul-again tanks. Apparently they still require replenishment by tanker truck. The plan does not present any comparative records showing the performance of recently built "ultimate" tanks in the Goldwater Range (such as Ewe, Ram, South Copper, and Geology Divide tanks). However, if we really thought that renovating Halfway, Buck Mountain, Buckhorn, Tuseral, Granite Pass, Senita, and North Pinta tanks would mean that they would be perpetual motion machines, we could support re-development, with the proviso that when

finished the access trails would be closed and revegetated for no one would ever need to drive there again.

MANAGEMENT TRAILS

As many management trails as possible should be closed within Wilderness. Originally they were dedicated to the hauling of water and monitoring of water levels, and that impact was relatively low. But, the trails soon were used by smugglers, law agents in pursuit, agents sightseeing, tourists sightseeing, sundry researchers, special guests, Native Americans, hunters, campers, bicyclists, and an occasional legitimate staffer with a special, legal purpose. Enforcement has been lax. The best solution is closing the trails, and eventually, when use by Border Patrol subsides, the trails may heal.

As former Secretary Bruce Babbitt told a conference of FWS managers in Colorado, "Roads are the single-most destructive agent aimed at pristine wildlife areas....Once a road is underway, what happens? It metastasizes. It expands, brings with it a rush or use and misuse, habitat fragmentation. We have to have places that are absolutely sacrosanct, that are not sliced and diced with roads." Roadless and vehicle-free are what Congress intended. The size and climate of CRNWR should not be excuses for violating the Wilderness Act.

REGIONAL ECOSYSTEM AND COOPERATION

The refuge should look beyond its borders to the regional ecosystem. We applaud the current staff for working effectively with neighboring land managers and associated agencies. We urge the plan to include study of designation of the refuge as a biosphere reserve or world heritage area. We endorse the concept of allied reserves, perhaps under the banner of Sonoran Desert Sister Reserves. This alliance of the Pinacate and the Alto Golfo biosphere reserves with the refuge, Organ Pipe Cactus NM, Sonoran Desert NM, and the Cabeza Prieta NWR would highlight the ecoregion and would heighten the effectiveness of the management of each area, adding value to them all.

Similarly, we endorse the proposed expansion of an inter-agency visitor center next to the current refuge office. It should be a boon to visitors, their education, appreciation, and safety, and it should help agencies obtain higher compliance with regulations. It will also help the local economy.

CPNWR STAFF

We appreciate the arduous effort by refuge staff in working with Homeland Security to solve the enormous problems of smuggling, illegal entry, and border security. The staff's effectiveness has so far saved the refuge as we know it, but many crises will come. The plan needs to give managers support, information, and leverage.

We encourage FWS to expand the refuge staff. Currently the refuge is understaffed and overextended. The staff needs to double in order to adequately serve visitors, monitor biological changes, conduct maintenance, do reports, attend meetings, enforce regulations, and the other thousand and one jobs that need done. A staff double or triple its current size would come closer to addressing real and future needs.

VISITOR SAFETY

We highly recommend a 24-hour hotline that visitors my call in event of an emergency. The Service does need a public safety plan. The public should be advised of unsafe conditions, especially where criminal activity (e.g., border bandits, smugglers) is concerned or where natural conditions threaten. The public should be informed of emergency phone numbers, medical locations, procedures, and hazards. The Service would do well to have a full-time emergency phone number where

visitors can notify the Service of problems on the Refuge; this phone could be in a central place (Albuquerque, Phoenix, Ajo), operators could field calls for several refuges across the Southwest, and then the operator could notify local personnel.

VISITORS AND CAMPING

We expected the draft plan to contain more information about special use permits (numbers, recipients, reasons), game surveys, visitor numbers (seasons, destinations, vehicles), impacts and "trips" by other agencies.

The plan should include provisions for monitoring the effects of legitimate visitors, establishing thresholds of unacceptable change, and limiting adverse effects. Eventually the refuge will need to set limits on the number of visitors and the maximum size of groups, especially vehicles. The refuge will need to designate campsites, for example 300 numbered spots along the public roads where 100 daily visitors with their vehicles can camp. The refuge should prepare for the day when quotas need to be set on the number of visitors to popular destinations such as Cabeza Prieta Tanks or Heart Tank. If this is not in the management plan, it will be difficult to assess and address these problems when inevitably they arise. A solid starting point can be found in a mid-1980s study by a group at the University of Arizona.

MANAGING PEOPLE

Through the efforts of many people, the Cabeza was designated wilderness in 1990. That enactment was a beginning, not an end. Now come the details of how to run the place. The difficulty, really, is how to let it run itself while managing people.

As Friends of Cabeza Prieta see things, you--we--everyone--have three challenges:

I. The first challenge: help the refuge be a wilderness.
To this goal, we urge that you:

a. eventually return El Camino del Diablo to an unmaintained jeep road.

b. manage the travel corridors as de facto wilderness so that they don't become quarter-mile wide strips of moondust totally out of character with the desert beyond.

c. manage aesthetically all signs of modern humans: our structures, campgrounds, litter, and tracks.

d. where feasible remove military debris, especially tow darts.

e. study the effects of visitation and plan to eventually limit the numbers and group-sizes of human visitors.

f. exclude all ATVs—their drivers seldom stay on designated roads and they are difficult for on-coming vehicles to see. Limit bicycles to public roads.

g. revegetate disturbed areas, including the cryptogamic soils torn by tire ruts. Start now.

h. retain the permit system in order to monitor and control visitation, to promote safety, and encourage visitors to report observations.

i. increase patrols and enforcement for trespassers and violations, which threaten to nibble this bold wilderness to death.

j. assess the effects of visitors and plan for an influx of visitors.

k. assure the exclusion of trespass livestock.

l. permit gas fires only; prohibit wood fires.

m. discourage recreational pack and riding stock. Dogs, horses, goats, alpacas each have some potentially adverse effect on wildlife.

n. insist that all uses and all users put wild things first.

o. consider a restrictive listing of incompatible usages, and put the onus of proving compatibility on the user. The refuge can expect to see requests for hang gliding, rock climbing, orienteering, geocaching, survival training, mountain biking, racing, and other activities that harm the landscape, wildlife, or Wilderness experience.

p. manage for wilderness values.

q. let abandoned represos degrade naturally.

II. The second challenge: let the wilderness be a refuge. To this goal we urge that you:

a. assess and use only those management practices which are scientifically proven to be sound. Provide justification for all FWS management techniques, as well as other agencies conducting activities on the refuge. In plain language, define FWS philosophy, policy, and goals.

b. abandon all unessential administrative trails and roads.

c. mitigate damage caused by past and current off-roading, over-use, and former military operations. Bill offenders for actual costs to repair the land. Bill agencies who must go off-road.

d. abandon all developed waters as an unproven and ineffective experiment.

e where possible remove invasive species, including foreign livestock and exotic plants.

f resist the urge to control predators. The previous attempts to control coyotes, for example, we ineffective and not in the spirit of a refuge.

g. limit research projects to those specifically important to the refuge; develop a listing of research priorities;

h study the external threats to the refuge and then consider joining other agencies in cooperative management plans, such as the International Biosphere.

i. re-aim the staff mission toward the management of people. Educate. Interpret. Reclaim trails. Inventory. Stamp out exotic, invasive plants and animals. Patrol for violations. Monitor changes caused by humans, including trans-border and trans-boundary threats. In short, there is far more to managing the refuge than hauling water.

j. "maintain the biological integrity, diversity, and environmental health" of the refuge, as required by the National Wildlife Refuge System Improvement Act of 1997.

k. even re-consider how the Cabeza and the Fish and Wildlife Service might fit into a national park, or an international park, or an international peace park, perhaps on the Chincoteague-Assateague model. Parks like to manage people, but FWS does

not; FWS may be better at managing wildlife, at least when active management is required, as in the case of Sonoran pronghorn.

l. realize that modern strategies of biodiversity, ecosystem management, wilderness, and unfragmented habitat best suit metapopulations of wildlife and endangered species. For example, the refuge needs to look at bighorn populations east of Highway 85 or south of Highway 2 and ask how those groups can occasionally mingle with the refuge herds.

m. in every action, in every inaction, consider the enlightened songs of biodiversity, of compatibility, of wilderness, of biological and historical heritage, of Biosphere, of preservation of all species from those most endangered pronghorn to the commonest bursage.

n. instill a management philosophy which values natural, self-sustaining wildlife populations.

The hardest thing for wildlife managers to do is do nothing. We all love to tinker with things, to study things, to manipulate things, to cuddle things to death, to make ant farms out of ecosystems. But in wildlife and wildthings, as in life-and-death medicine, the first rule is don't harm that which we're trying to save.

In this refuge we must realize that doing nothing may be best. We must confront the possibility that if we manage people, the wilderness and refuge will take care of itself. Lest Friends of Cabeza sound out of tune, may we remind you that this is a cutting edge discussion in such publications as the *International Journal of Wilderness*, which is co-sponsored by USDI Fish & Wildlife Service. Two sample articles for example, are D. Carter, Maintaining wildlife naturalness in wilderness, 3(3)17-21; J. M. Glover, Soul of the wilderness, 6(1)4-8.

Let this refuge be itself. Let it be a desert. Let it be a wilderness with wild things.

III. The third challenge: allow people to enjoy the refuge, understand it, love it.

a. Help visitors have safe, fun, and educational visits.

b. Enhance the visitor center with a 40-acre, multi-agency educational complex.

c. Conduct regular patrols and provide emergency services, including a 24-hour phone hot-line.

d. Treat first-time visitors to a brief introduction to the refuge, including hazards, biology, history, and wilderness ethic. This could even be done on the Internet. Inform visitors about camping etiquette and how to tread lightly.

e. We applaud the Childs Mountain exhibit and excursions, and look forward to the day when it is daily open to the public.

f. Assure protection of Native American sacred sites. Protect the archaeology.

g. Work closely with Native American nations.

h. Locate, record, interpret, and preserve the Cabeza's historic and prehistoric sites.

i. Survey the archaeology of heavily used areas on the refuge, e.g. the El Camino del Diablo corridor, Charlie Bell Well area, and Tule Well area. As funds become available, survey other

parts of the refuge.

j. Launch a program to acquire, archive, and interpret its own administrative history, as well as that of the people who have lived and worked on the Refuge.

k. Prepare a policy and standards for commercial users of the refuge. Jeep tours, hosted campsites, guided adventures will be coming soon, if they're not already here.

l. Plan ahead. Arizona's population is now at 5 million and growing fast. Set a policy on compatible and incompatible uses. For example, are hang gliding, rock climbing, and mass vehicle tours compatible? Policy is best set before the barn door opens.

m. We applaud the work of the CP Natural History Association.

CONCUSIONS

In general we endorse management Alternative Three, but there are credible points in the alternatives. For example, we support the expansion of the refuge office into a regional visitors center (option 4), the omission of Copper Canyon loop (option 1), and limiting administrative roads (option 2). Some of the alternatives are decoys and deceptive: for example bighorn sheep alternative 2 calls for a population goal of 100-200 bighorn when no modern survey has registered that few. And some are a bit confusing: bighorn sheep alternative 4 calls for a population goal of 500-700, when the surveys of 1993-2002 show ranges already overlapping that goal.

FWS has two great desert refuges in this region. The Kofa already is heavily managed (many developed waterholes, frequent wildlife translocations, general hunting) and its wilderness crossed by cherry-stemmed roads. In contrast with the Kofa, we believe that this region needs the second refuge to be lightly managed, to let nature run things, to serve as a reservoir of baseline desert biology and study. This should be the Cabeza.

"The best management for this fragile environment is probably no management. LEAVE IT ALONE-- stay out of it and off of it" (Ken Voget, Manager CPNWR, 1977 Annual Narrative).

There are reasons why The Wilderness Society has twice declared the Cabeza as one of America's most endangered wildernesses. It is time for FWS to take its wilderness responsibility seriously. Frankly, the Fish & Wildlife Service may need to clarify its role on the Cabeza. Three other agencies issue refuge visitor permits; AGFD manages the wildlife on the refuge, including the bighorn hunt, and conducts the wildlife surveys; until recently AGFD and BLM seemingly had been the lead agencies for Sonoran pronghorn recovery; other agencies conduct the majority of law enforcement on the refuge. FWS claims to be increasingly helpless in preventing or handling damage from off-roading and trespassers. Yet, FWS continues to under-fund refuge operations and is unwilling to make long-term commitments to a place that it sometimes calls "the wilderness flagship of the refuge system." In short, at <u>all</u> levels of the agency FWS needs to live up to its responsibilities to this land, these species, the public, and its employees.

In 1990, Congress deliberated and decided to make 803,000 acres of the Cabeza Prieta National Wildlife Refuge a designated Wilderness. We sense that there are still personnel within the Fish and Wildlife Service, the Arizona Game and Fish Department, the military, and the general public who are still resisting the 1990 Desert Wilderness Act. We hope that someday they come to fully appreciate and support Wilderness. This CCP plan can be a big step forward.

We sincerely hope that the FWS can live up to its renowned history and its lofty mission. Much is at stake for the Cabeza Prieta NWR. In an ideal world, FWS would even manage the Goldwater Range.

In 1913 Charles Sheldon was hunting bighorn in what is now the western refuge, and he wrote in his diary (Carmony and Brown 1993:47): “This is my last night here alone….I cannot forget these mystic nights, sitting alone here in camp in the moonlit desert---the calm, the silence, the radiance of the mountains, the softness of the light, the mystery of the pervading scene.” We need a wild, natural refuge where Charles Sheldon would still feel at home.

For these reasons, we support most points of Alternative Three and urge you to adopt it. We look forward to FWS showing that it can live up to Congress’s mandate: manage the Cabeza Prieta NWR as a wilderness area for the benefit of desert wildlife. The Cabeza Prieta is a refugia for wildlife and an irreplaceable wilderness resource for current and future generations of humans. We and the living desert are counting on you.

For Friends of Cabeza everywhere,
s/ Bill
Broyles

#17.

Lainie Levick
12120 E. Snyder Road
Tucson, AZ 85749

August 8, 2005

John Slown
Division of Planning
NWRS R-2
U.S. Fish & Wildlife Service
PO Box #1306
Albuquerque, NM 87120

Re: Cabeza Prieta National Wildlife Refuge, Draft EIS/CCP

Dear Mr. Slown,

I have been hiking, backpacking and camping at Cabeza Prieta for nearly 20 years and consider it to be one of the prime jewels of the Sonoran Desert. It is a tragedy that the current border situation is resulting in so much environmental damage to this fantastic place. I realize that this issue is beyond the scope of this EIS/CCP, and that the Refuge cannot control the activities of the Border Patrol or military. However I would like to offer for your consideration a few comments on that issue in addition to my comments on the Draft EIS/CCP in general.

1. The MOU and Interagency Agreements with the Border Patrol & INS are several years old. While they appear to cover most situations, they should be revisited to ensure they meet the current needs of the Refuge with respect to the increased border traffic, especially:
   a. to define "Emergency Situation" which would allow off-road travel (Appendix A, p. 266, USFWS/CPNWR + INS/BP Interagency Agreement);
   b. to define "within a reasonable distance of the border" (MOU, Background, p. 272).

2. None of the Alternatives represented my vision for optimal management and protection of the Refuge. However, I generally support Alternative 3, with some exceptions as noted below.
   a. Endangered Species: Alternative 3 with installation of a gate at the entrance to lesser long nosed bat roost (Alt. 4), and annual Sonoran pronghorn population surveys (Alt. 5).
   b. Desert Bighorn Sheep: Alternative 3, but with no hunts.
   c. Wildlife Management in wilderness: Alternative 3, with improvements of developed waters to require less maintenance/water hauling, and to better blend in visually (Alt. 4).
   d. Wilderness recreation: Alternative 3, but pack/saddle stock not allowed (Alt. 2). The damage from these animals to the resource is not acceptable or consistent with the goals of this plan. In addition, feces from stock bring in exotic plant seeds which interfere with native species and increase fire hazards.
   e. Permitting and Access: Alternative 3, with permits accessible by telephone or internet.

   f. Hunting: No Hunting (Alt. 2).
   g. Environmental Education and Interpretation: Alternatives 3 and 4.
   h. Camping: Alternative 3, with wood fires allowed with fuel hauled in from off-refuge (Alt. 4).
   i. Cultural Resources Management: Alternative 4.

I appreciate and support the ecosystem approach taken in this Draft plan and also support the identification and protection of wildlife corridors to connect fragmented habitats. So much of Cabeza Prieta exists in a relatively natural, unaltered state that it must be protected as much as possible. Wilderness characteristics should be maintained. The main threats to Cabeza right now result from the border situation. A broad ecosystem management approach is needed to adequately address these problems.

Thank you for the opportunity to comment on this plan and be involved in the protection of this spectacular piece of Sonoran Desert. Please keep me on the mailing list for all actions or activities concerning Cabeza Prieta.

Sincerely,

Lainie Levick

Lainie Levick

PhxZoo
455 N. Galvin Parkway
Phoenix, Arizona 85008-3431
602-273-1341

August 10, 2005

Mr. John Slown
Division of Planning
NWRS R-2
U.S. Fish & Wildlife Service
Albuquerque, NM 87120

Dear Mr. Slown:

Thanks for the opportunity to comment on the Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan on the Cabeza Prieta.

A lot of good analysis has been done. My organization (The Phoenix Zoo/Arizona Zoological Society), and I personally as a citizen, have worked on the Cabezia for more than a decade. It is a unique, distinctive, and important wilderness and natural area, and it deserves our protection. It is also a landscape under siege and it has been brutalized over the last half decade. In an effort to be brief, we support by and large the Alternative 2. We suggest that caution should be shown in the use of artificial waters. Whenever non-native water is used it should

be accompanied by a full resources study design and protocol that quantifies the effect of the water on carrying capacity, both plant and animal composition, and abundance. In the absence of that commitment, water should not be imposed except in limited support for Sonoran pronghorn.

Four other points for consideration:

(1) Understanding the extraordinary challenge associated with illegal traffic efforts still need to be made to implement strategies that link wildlife populations on both sides of the border and where other barriers like Interstate 8 can restrict movement and result in island populations with limited genetic exchange.

(2) The stewardship program should focus on educating the public and border parole on the most effective ways to interact within this fragile landscape doing the least amount of harm. Stewardship should also focus on trying to reduce or eliminate invasive non-native species. My organization would be willing to help develop and resource a citizen stewardship program that works in these areas.

(3) Low enforcement is critical. The extent of damage associated with vehicles is dramatic and must be curbed.

(4) Monitoring in a constant and systematic way that informs and motivates adaptive management is also critical. The agencies, land managers, and volunteers must have good information on trends in landscape health and the ability to implement strategies that address trends.

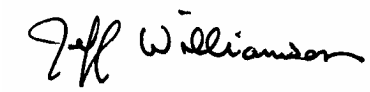
The single most important consideration is resourcing. The best plan in the world cannot be effectively implemented unless there is a long-term commitment to making well-trained, knowledgeable staff with sufficient resources available to implement management strategy consistently, and over extended time.

It would be helpful is a business plan was incorporated that indicates by priority where resources will come from, and got to, at least in increments of two years over the next decade.

In all cases, carrying capacity should be calculated every two years based upon the health of the biotic community; and the condition of abiotic's and human use should be adjusted up or down, so that it does not exceed the capacity of the landscape to persist in a healthy way.

Thanks for the opportunity for input.

Sincerely,



Jeff Williamson
CEO/President

JW/an

August 9, 2005

Larry Bell
Acting Regional Director
U.S. Fish and Wildlife Service
500 Gold Ave. SW
Albuquerque, New Mexico 87102

RE: Comment Extension for Draft Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan

Dear Mr. Bell,

On behalf of Defenders of Wildlife and the Wilderness Society, I am writing to request a comment extension for the Draft Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan (CCP).

The draft CCP was originally released in March of 2005 with a 90-day comment period. The CCP was later retracted due to an administrative error. Interested parties received a letter (see attached) from John Slown, planner for the CCP, stating that the public "will be notified when the public comment period reopens, and a full 90-day comment period will follow the reopening."

The public comment period was officially reopened, via a Federal Register notice (70 Fed. Reg. 36204), June 22, 2005 which posted a comment deadline of August 15, 2005. This is only a 52-day comment period. We respectfully request the comment period be extended to the intended 90-day comment period and recommend a full 120 days due to the complexity of the issues involved. The CCP is over 500 pages in length and contains a great deal of scientific information. The CCP covers an expansive refuge, major Wilderness and endangered species concerns, and the refuge faces complex issues related to the U.S. Mexico border. In short, in order for the public to be able to read, digest and provide meaningful and substantive comment to the Fish & Wildlife Service, an extension of the comment period is needed.

Finally, we note that with initial planning process beginning in 1994, and a first draft CCP that was withdrawn in its entirety in 1999, that the Fish and Wildlife Service has had a decade to assess the situation, pour over the science, develop management alternatives and assess their environmental impacts. Given this length of time and extensive inter-agency review, it is reasonable for the public to have 120 days in which to provide the Service with substantive comments.

Thanks for your consideration, and please contact me with any questions.

Sincerely,

Noah Matson
Defenders of Wildlife

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Telephone: 202-682-9400

Sierra Club, Grand Canyon Chapter
202 E McDowell Rd. Ste 277
Phoenix, AZ 85004

August 10, 2005

John Slown, Division of Planning
NWRS R-2
U.S. Fish & Wildlife Service
Albuquerque, NM 87120

Dear Mr. Slown:

Please accept these comments on the *Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan* on behalf of the Sierra Club's Grand Canyon Chapter and our more than 13,000 members in Arizona. Our members explore and enjoy the Cabeza Prieta and care about the protection and management of the area and its resources.

With 93% of its lands designated wilderness, the Cabeza Prieta National Wildlife Refuge represents the largest wilderness area in Arizona. The Cabeza Prieta region has outstanding ecological, geological, cultural, and educational values. The area is threatened by illegal off-road vehicle activity, invasive/exotic vegetation, habitat degradation, and border traffic funneled into the refuge by increased border enforcement activities at other points of entry along the US-Mexico border.

We encourage the U.S. Fish & Wildlife Service (USFWS) to support the strongest protection of wilderness and wilderness values for the Cabeza, a minimalist approach to water developments in wilderness, and the actions that will best protect Sonoran pronghorns and all other wildlife on the refuge. We encourage the USFWS to select and implement Alternative 2, but to also include elements of Alternatives 3 and 4 as well. Alternative 2 affords the greatest protection for wilderness and over the long term provides greater protection for all of the Cabeza's wildlife.

In our comments, we will focus on the environmental impacts, the effects on wilderness and the impacts on wildlife.

Environmental Consequences

Physical Environment:

Soils - Alternative 2 will decrease soil disturbance by reducing vehicle operations on roads and administrative trails by 50%. While Border Patrol levels will likely remain the same, decreasing the administrative use and driving in the refuge will limit soil disturbance which in turn will help limit the introduction of exotic species and also might help deter others from driving in these areas.

While we generally do not object to the proposal to enlarge the visitor center (Alternative 4) and the limited soil disturbance associated with it, we are concerned about the funding for this proposal and would instead like to see the refuge invest those dollars in people, restoration, and other wildlife programs.

We are not supportive of the proposal to redevelop 12 of the developed waters in the refuge. Wildlife waters are controversial in that there is no indication that they help wildlife over the long term. We are concerned that they advantage one species over others and temporarily sustain an unsustainable population of animals which in turn has a significant and detrimental impact on the habitat and available forage. We do understand and support the short-term intensive measures taken to sustain the Sonoran pronghorn, but encourage the Service to look for long-term restoration of this animal, including providing connections and wildlife travel corridors in areas that have been fragmented. I-8 is one example of where a connection might assist these animals.

Cryptogrammic Soil – Of the proposed alternatives, Alternative 2 affords the greatest protection of cryptogrammic soil. We suggest including a provision from Alternative 3 which includes enhanced orientation and wilderness training of border patrol law enforcement prior to their being deployed on the refuge. This will also help limit impacts to these soils, wilderness, and wildlife.

Water Resources – As indicated above, we encourage USFWS to limit the development of additional waters and to minimize developed waters in wilderness. Development of these waters becomes an excuse to drive everywhere and there is little or no indication that they support the long-term viability of wildlife populations.

The refuge has 30 developed waters and water is hauled to approximately nine of these sites each year, disturbing the land with heavy trucks. More research is needed on waters and wildlife and the effects of these waters on overall habitat. Do they advantage one species to the detriment of others? There are indications, for example, that these catchments result in the increased mortality of the Mojave desert tortoise. (See issues relating to management of the Mojave National Preserve.) Do they result in the overall habitat being hammered during times when it can sustain fewer animals? Do they even help bighorn sheep? Arizona State University biologist David E. Brown has observed that helicopter surveys of dry ranges south of the border have indicated a higher density of bighorn sheep than similar areas in the United States that have these water catchments. (See "Artificial water holes awash in controversy" *Arizona Daily Star*, 01/18/04.) We support minimal intervention with water developments in the Cabeza, including no additional water developments, and limitations on hauling water to developments in the wilderness area, plus the removal of structural improvements to developed waters as indicated in Alternative 2. In addition to this, we support the proposal to test the pronghorn waters for pathogens.

Habitat and Wildlife Resources:

Biotic Community and Biodiversity – We support the general minimalist approach in Alternative 2, but do want to encourage the Service to include another provision from Alternative 3 in a preferred alternative in the final Environmental Impact Statement. The Refuge should work with Refuge partners to develop experimental desert restoration sites in refuge non-wilderness areas. Considering the increasing impacts of border activities, restoration is and will continue to be necessary. These restoration sites should include the

use of seeds and plants from the refuge itself so diseases and exotics are not inadvertently introduced. We also encourage the USFWS to work with the Air Force and the Arizona Department of Transportation to develop wildlife travel corridors across the Barry M. Goldwater Range and State Highway 87, among others. (page 218)

Alt 4 includes implementing a program for inspecting staff clothing and vehicles for plant seeds to prevent the spread of invasive plants. We support including this proposal in the final preferred alternative. (page 221)

Refuge-wide mapping of resources to determine degradation and intact ecological communities in order to help with restoration and research is an important element of good management. Supplying water need not be a part of this proposal however as indicated on page 221 of the draft.

Plant Resources – The Sierra Club supports control of exotic and invasive species on the refuge through methods that preserve and protect wilderness values at the same time as they deter exotics. The landscape of the Cabeza, though hard and tough, is also easily scarred. The vegetation still bears the damaging mark of grazing's past. The Cabeza's plant resources are important ecologically as well as culturally.

Invasive species that threaten the plant species composition include fountain grass, Sahara mustard, red brome and buffelgrass. These species can assist fire to burn in a place that evolved without fire, which kills cacti and other native trees and shrubs. Therefore it is important that the refuge manage proactively to prevent exotic plant species from establishing on the refuge and to eradicate the invasive species already established via hand-pulling to remain aligned with wilderness management.

As indicated above, we support the provision in Alternative 3 which includes inviting partners to develop restoration areas outside the wilderness. This along with limited vehicular use and cross border cooperation will provide the greatest benefits to plant resources on the refuge. We support the Refuge's continuation of removing newly found populations of exotic fountain grass by hand and can offer assistance in volunteer service work to remove it, if that is appropriate.

Mammals – While it is likely that the cessation of hauling water to some of the water holes might have limited short-term negative impacts on some species of wildlife, there is no indication that elimination of these waters will have any long-term detrimental impacts on these species. It is quite possible that elimination of these waters might benefit certain species and also the overall habitat. It is quite possible that hauling of water without the accompanying rain that produces forage artificially inflates the population of certain species which can then have a negative effect on forage and on other species. We recommend the elimination of waters in wilderness and the continued research on these wildlife waters. Use does not necessarily indicate benefits. (page 223)

Federal Threatened and Endangered Species – All alternatives implement the Sonoran pronghorn recovery plan which focuses on intensive management to recover a species on the brink. We do encourage the USFWS to embrace long-term solutions which include connecting

habitat, working with Mexico, and working with adjoining property managers. Again, we are supportive of Alternative 2, but would like to see the provision in Alternative 3 that emphasizes the USFWS working with other agencies to encourage off refuge changes to assist with the recovery of the pronghorn included in Alternative 2 or a future alternative. Eliminating fencing and establishing travel corridors will benefit these animals. We do question the need to develop additional wildlife waters however and encourage more research on this issue and its long-term impact on wildlife. (page 226) Collaring coyotes in the refuge to better understand their interactions with pronghorn and other species is also a worthy project for the Refuge. Killing coyotes, however, only gives a short-term bump to the pronghorn and is not a viable long-term solution. As wildlife managers and urban dwellers alike have found, human efforts to eliminate coyotes has only resulted in their compensating for our actions – their numbers and range have increased significantly.

The statement on page 227 is troublesome. It says "Allowing any developed water that has been used by Sonoran pronghorn to go dry is likely to cause negative effects on the population if water is limiting." Again we ask, are there opportunity costs for the pronghorn related to use of these waters? Do they advantage pronghorn predators? Do they result in forage over utilization? While some short-term more extreme measures to recover the pronghorn have been warranted, we encourage the Service to look long-term recovery and implications of some actions.
We do support pathogen sampling from pronghorn waters okay as indicated in Alternative 4. (page 227)

The gate to afford greater protection for lesser long-nosed bats as indicated in Alternatives 4 and 5 does appear to be warranted and appropriate to help these important animals. (page 229) We encourage the Service to also do enhanced public education regarding the importance of bats to the habitat.

We encourage the Service to carefully examine how many bighorn sheep the Refuge can sustain. Drought, fragmented habitat and human disturbances are the greatest factors affecting bighorn. Predators are easy to blame, but considering these animals and predators have coevolved, it is the easy answer, but not the right one. We encourage the Service to again look at the long-term sustainability and to not try to artificially inflate the number of bighorn on the Refuge.

Special Management Areas:

Wilderness - Alternative 2 affords the greatest protection of wilderness and wilderness characteristics of the Refuge. It means less water hauling (page 243) and less administrative use of travelways in the wilderness. We support the closure of 60 miles of administrative tracks open on the refuge. Roads disturb and fragment habitat and roads do not belong in wilderness. (Alternative 2) We also support the minimization of developed water catchments in the wilderness. Keep it natural, undeveloped and maintain outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Childs Mountain Communications Site – We support the provisions in Alternative 2 to not add new equipment to this site and to allow the memorandum of

understanding to expire and remove the equipment after that occurs.

Cultural Resources - The USFWS should protect cultural resource areas from damage due to unauthorized entry. Periodic patrolling by refuge law enforcement officers will help avoid damage and discourage unauthorized entry to these sensitive areas (Alternative 4). Under current actions, sites are only checked for damage if they are near an area that is being monitored for a different project and no record is being kept on what damage, if any, is found. We support periodic patrolling under conditions where USFWS specifies exactly how these patrols will be done (foot, horse, ORV, etc.). If patrolling will cause a greater negative effect on wilderness and wildlife then it will do good, we do not support patrolling of these areas. If patrols can be done with minimal effect on wilderness, including by foot or horse in the wilderness, we suggest that the refuge staff take an initial inventory of all known sites so that references can be made on how much damage is occurring in these areas (issue not present in any of the proposed alternatives). Patrols should be done only once a year preferable by foot and a different route should be taken each year to avoid trampling vegetation in the same area every year. If yearly damage is caused by natural forces: rain, wind, heat, etc, no stabilization measures should be taken in that area. However, if sites are being looted, archaeologists should be allowed in, by foot, to collect remaining surface artifacts that can be carried out, so that the Arizona State Museum can curate them. Under no circumstances should vehicles be allowed into these areas.

Hiking trails should not divert visitors into these sensitive areas and the known areas of cultural occupation should remain unpublished, including in the visitors center to avoid hikers, campers and pot hunters from seeking them out. We strongly disagree with panels interpreting the early history of Ajo with place cards on refuse heaps on the visitor center site (Alternative 4). Although it would provide education for visitors it may also inadvertently attract pot hunters and looters to these areas who will tear apart the refuge in search of artifacts. With respect to on-site interpretation, Alternative 1 should be followed providing no on-site interpretation of cultural resources. Training border law enforcement (Alternative 4) will also help to avoid damage during border law enforcement operations.

Public Use – We support the provisions in Alternatives 2 and 3 which limit the maximum length of stay to seven days (without a special use permit) and the party size to eight. We encourage the USFWS to also consider limiting the number of vehicles that can drive in groups in the non-wilderness areas of the refuge.

Additional General Comments

Pack Animals

Since we know that pack/ saddle animals tear up the land more than other animals, we encourage the Service to limit the use of pack animals on the Cabeza Prieta. The plan states "Pack and saddle stock cause much greater impacts on campsites and trails than do hikers.(p.74) (Spildie 2000).

The draft EIS/CCP document states (p. 74) that "virtually all of the pack and saddle stock on the refuge has been by desert bighorn sheep hunters" and also refuge visitors may use pack animals subject to a special use permit. The details of the special use permit include: a maximum of four horses/burros/mules per party, travel only on the administrative trails, dry washes and mountain range bases, no grazing on refuge, no use of refuge water holes, tinajas, tanks, etc. to water stock and feed pellets or processed and pelletized feed only while on the refuge and for three days before entry. IF these procedures are followed then Alternative 1 or 3's special use permitting for pack/ saddle stock use is likely to result in minimal negative impacts to the refuge.

However, the document does not state who monitors these procedures or if the permits are on an honor system. Who makes sure the procedures are followed, especially the prohibition on using water found on the refuge for livestock? If it is an honor system it seems problematic because it seems unlikely that riders would bring in 100% of the water for to be used for their animals. What about the possibility of livestock borne disease being transmitted to native wildlife? Given the extremely low numbers of Sonoran pronghorn and the desert bighorn sheep which suffer from susceptibility to disease, this information should be researched and available. As indicated in the document, bighorn in the Refuge already suffer from chronic sinusitis.

Alternative 2's prohibition makes the most common sense. Consider the document's finding (in the Draft Compatibility Determination in Appendix E p. 390) that recreational horseback riding is a use **not** compatible with the Cabeza Prieta National Wildlife Refuge. The determination explicates the impacts including soil disturbance, introduction of exotic species through seeds in their waste, and damage to vegetation from tethering and trampling. To ensure compatibility, stock users are allowed on a case-by-case basis and the issuance of a special use permit. The requirement of pelletized food (so no exotic seeds are in animal excrement) for three days prior to entry onto the refuge is usually written in the permit.

Given how great the damage is that pack/saddle stock can inflict on the fragile Cabeza landscape, we support Alternative 2's barring the entry of pack/saddle stock and by no means should Alternative 5 ever be considered.

Thank you for considering our comments on this important management proposal for the Cabeza Prieta. The Sierra Club and our members strongly support the Refuge and its protection. We encourage the Service to put wilderness, wildlife and habitat protection first in drafting the final EIS for this plan. We also offer our volunteer service to help with restoration and other projects in the Refuge. Please keep us apprised of any developments relative to this proposal.

Sincerely,

Sandy Bahr, Conservation Outreach Director
Sierra Club – Grand Canyon Chapter

John Slown,
I have just mailed you my comments; they are slightly different from the E-mail copy. Please use the hard copy.

By the way, a little historical inaccuracy I intended to point out in my comments but forgot.
Page 12 of the draft plan says "...El Camino del Diablo, a trail pioneered by Meliclor Diza in 1659...." Page 238 refers to "...the original migrant trail through the area, initially pioneered by Meliclor Diaz in 1659."
* The person in question was named Melchior Diaz,
* he was in the general area in 1540,
* he almost certainly did not "pioneer" El Camino del Diablo. Parts of it, at least, were undoubtedly a Native American trail for hundreds if not thousands of years previous.
* He and his party WERE the first individuals of European descent to be in SW Arizona.
* We don't really know what route he followed; from Sonora he may have gone through the Pinacates and up the west side of the Gila Mtns., or up the east side, on his way to the Colorado River and beyond. His precise route is unknown.
Melchior Diaz is a well-known historical figure, mentioned in many histories of the Southwest; whoever wrote about him should have been more careful.

Gayle Hartmann

----- Original Message -----
From: <John_Slown@fws.gov>
To: "Gayle G Hartmann" <gayleh@theriver.com>
Sent: Thursday, August 11, 2005 6:55 AM
Subject: Re: Comments on CPNWR plan

> Gayle Hartman,
>
> Thank you for your comments on Cabeza Prieta's draft Comprehensive
> Conservation Plan, draft Wilderness Stewardship Plan and draft
> Environmental Impact Statement. It opened on my computer with no problem.
> Due to requests from some intervenors, we have extended the comment period
> for an additional 30-days. Sorry to give you the information so late, but
> it just happened.
>
> Thanks for your interest in Cabeza Prieta NWR.
> _____
> John Slown
> Biologist/Conservation Planner
> US Fish and Wildlife Service
> National Wildlife Refuge System, Southwest Region
> Planning Division
> P.O. Box 1306
> Albuquerque, NM 87103
>
> 505-248-7458 (voice)
> 505-248-6874 (fax)
>
>
>

B21

GAYLE G. HARTMANN
2224 EAST 4TH STREET
TUCSON, ARIZONA 85719

10 August 2005

TO: John Slown
USFWS, NWRS, Southwest Region, Planning Division
PO Box 1306
Albuquerque, New Mexico 87103

FROM: Gayle Hartmann
2224 E. 4th St.
Tucson, AZ 85719

RE: Cabeza Prieta National Wildlife Refuge, Draft Comprehensive Conservation Plan

I appreciate the opportunity to comment on this draft plan, which has been in the works for a considerable length of time. My comments focus on the proposed actions relating to cultural resources since that is where my expertise lies. At the end, I will comment on other specific proposals as well as issues relating to ecological and wilderness values.

In reviewing my own previous correspondence with the Fish and Wildlife Service, I find that I wrote in June 1994 and June 1997 on the issue of cultural resource management. In both those letters I noted that the management at the Cabeza Prieta National Wildlife Refuge has, in general, displayed a cavalier attitude toward cultural resources. In the years since I wrote on this issue I have seen little change in the way cultural resources are managed.

In June 1997 the organization *Friends of Cabeza Prieta* wrote a lengthy comment responding to the USFWS planning process on the CPNWR that was then ongoing. Because the issues raised are still applicable, I quote, in the two paragraphs below, the comments on cultural resource management from that letter.

> Management of cultural resources on the refuge has been rather piecemeal. Refuge staff has typically been untrained in the inventory and management of archaeological resources. This is especially unfortunate since the refuge is rich in these assets. This valuable information is susceptible to loss as time goes by, either as a result of direct actions (artifact theft, etc.) or indirectly due to lack of information or inadequate surveys before destructive activities are carried out. In the past, many refuge managers did what they could to avoid the management of these resources. This type of neglect must end. We are pleased to see that the Service is

advocating a more active role in this regard, and encourage them to seek the funding necessary to accomplish this task.

> We have learned that the Service may not be taking full advantage of funds and personnel currently being utilized in conjunction with the Air Force's LEIS work on the renewal of the Goldwater Range. Considering the refuge's difficulty in acquiring funds to accomplish needed cultural resource surveys, we strongly urge the Service to cooperate with the Department of Defense in this matter, so long as wilderness values are thoroughly protected. Attempts should be made to reconcile any interagency differences which may be present. The refuge desperately needs adequate surveys [emphasis added], and it would seem unreasonable to pass on the opportunity if one is presented.

I realize that the staff at the refuge is limited and that none has a professional background in cultural resource management. I also realize, that unlike the National Park Service, whose primary mission is the management and protection of cultural resources, the USFWS has a different mission: "... the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats.... At the same time, other Federal land management agencies such as the National Forest Service and the Bureau of Land Management, which have primary missions not related to cultural resources, have been quite successful in incorporating the management of cultural resources into their administrative systems. And, closer to home, the Air Force and the Marine Corps (the agencies that manage the Goldwater Range) both have cultural resource staff There is no reason the USFWS cannot do likewise.

In that regard, it is worth nothing that the Federal law regarding the management of cultural resources by land management agencies makes it clear that the USFWS must do better than it is doing. Let me remind you what Section 110 of the National Historic Preservation Act, with its 1992 amendments, has to say on this question:

> Each Federal agency is required to establish a historic preservation program. The program must provide for the identification and protection of the agency's historic properties; ensure that such properties are maintained and managed with due consideration for preservation of their historic values; and contain procedures to implement Section 106 [Section 106 requires that prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, the agency shall take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register.] Specifically, the 1992 amendments explain that the procedures to implement Section 106 must provide a process for the identification and evaluation of historic properties for listing in the National Register and the development of agreements in consultation with SHPOs, local governments, Native Americans and the interested public.

Thus, from the point of view of cultural resource management, Alternative 4, although inadequate, is the best alternative presented.

- "Interpreting the early history of Ajo at the visitor center site" is an extremely worthwhile effort that will be of interest to the many visitors unfamiliar with the region.

- "Periodically inspecting known sites for damage," although worthwhile, is reactive rather than proactive. Most known sites haven't even been recorded, they are just known anecdotally. An inventory program should be the first order of business and that is not being considered in any alternative. In addition, due to the lack of archaeological/historical background on the part of the Refuge staff, "periodically inspecting sites for damage" may not yield much useful information.

- "Developing stabilization measures if needed" sounds like an action more suited to aboveground pueblos than to surface artifact scatters, fragile foot paths, rock art, and historical mining locales. It is true that (1) erosion is a problem in large prehistoric campsites located along washes and (2) sites are easily damaged by vehicular activity associated with illegal immigrants and the Border Patrol. However, developing appropriate stabilization measures in response to these situations would require considerable expertise – more than the CPNWR staff possesses at present.

- The final proposal is to "provide training to border law enforcement personnel regarding the sensitivity of refuge cultural resources and avoidance of damage to cultural resources during border law enforcement operations." This is a positive recommendation and should be implemented. However, because of the rapid turnover in border law enforcement personnel, this is not as easy to accomplish as it sounds. Training programs will have to be repeated frequently and someone on staff will have to have the knowledge to conduct them.

- All of your alternatives call for increases in staff, up to five in Alternative 5, but there is no mention of the need for a staff archaeologist. Because of the National Historic Preservation Act requirement that an inventory and protection program be put in place and because of the proposal to provide training to border law enforcement personnel, there is clear need to add an archaeologist to the Refuge personnel.

A final comment relates to funding. As was noted above in the second paragraph from the *Friends of Cabeza* letter of June 1997, funding for cultural resource management programs may be more available through the Department of Defense than the Department of Interior. Although the CPNWR is no longer technically part of the Goldwater Range, because of the close relationship between the two, a Memorandum of Understanding is still in effect. Thus, it seems likely that, if the Refuge had an archaeologist on staff and if it created an inventory and protection program, military funding might be available for cultural resource programing. This is an avenue that should be pursued.

I close this letter with a few comments on specific proposals as well as issues relating to ecological and wilderness values. Specific proposals that should be pursued center around the management of visitors; the desert can largely manage itself. Because of the large size of the refuge, the need for 4-wheel-drive vehicles on most of it, the knowledge needed to cross it, and

the summer heat, many visitors do not venture beyond the visitor center. It is time to provide good quality interpretation at that location and nearby. Some of your proposals that are worth pursuing:

* expand the visitor center,
* have seven day a week staffing during the winter season,
* have a 24-hour hotline,
* develop a new refuge video and an interpretive pamphlet for the existing trail,
* lead guided interpretive walks,
* offer lectures and workshops,
* provide an ADA accessible trail and overlook of the desert pupfish refugium,
* pursue the addition of 30 acres to the visitor center site,
* develop a trail on that site,
* open Childs Mtn. to the public.
* And, I would add, provide interesting and accurate information and interpretation of the prehistory and history of the refuge.

Turning to ecological values, I am not a biologist and, thus, claim no professional knowledge when it comes to big horn sheep populations, water hole development, etc. At the same time I have visited the refuge many times beginning in the early 1970s, I have worked on the Goldwater Range in various capacities, and I have a working knowledge of biological concerns.

Your own mission statement states clearly that you are to focus, first and foremost, on the conservation of fish, wildlife and plant resources and their habitats. To me this sounds like an ecological mandate that requires you to understand and preserve all animals and plants. Unfortunately, much of the focus of all your alternatives is on manipulations of the natural resources in an effort to increase the big horn sheep population. Although it is never specifically stated, the reason for this increase seems to be for the sole purpose of providing more sheep to hunt. I am not opposed to hunting, and see no reason why a small big horn sheep hunt, properly conducted, cannot continue, but it is counter to any principle of conservation to increase the sheep population (by adding water catchments) to a number far greater than has been sustained in historic times (Alternative 5). Won't this have a serious negative impact on habitat?

In terms of providing some opportunities for research that should provide you with useful baseline data, "Desert Ecosystem Integrity Monitoring" in Alternative 4 is a good approach. However, the predator hunts and hunts of other animals proposed in Alternatives 4 and 5 seem completely contrary to fulfilling an ecological mandate.

Also, it is important to remember that, since 1990, most of the refuge has been federally designated wilderness. A principle tenet of wilderness designation is that motorized vehicles are prohibited. The best way to comply with this designation is to limit vehicles to the roads that are outside of wilderness. It may seem simplistic, but instead of trying to close a certain number of miles of "Administrative Trails" in one alternative, and a different number of miles in another alternative, why not make it a goal of all alternatives to simply abide by the law?

So far, I have not commented on what today is the major issue on the refuge: the activities associated with illegal immigrants and with their apprehension. It is clear this has taken a serious toll on both the environment and the staff, not to mention the physical toll on many of the immigrants. Even though much energy is devoted to dealing with this problem and any solution seems unlikely in the immediate future, eventually it will be resolved. In the meantime, it is important do whatever can be done to ameliorate the damage caused while creating a plan that conserves the multiple resources of the refuge, both natural and cultural, into the distant future.

August 11, 2005

To John Slown

Please support the strongest protection possible for the Cabeza Prieta National Wildlife Refuge. This is an important part of our natural and cultural heritage. We stand to loose a great deal if the Cabeza Prieta's wildlife habitat, cultural, and educational values are undermined.

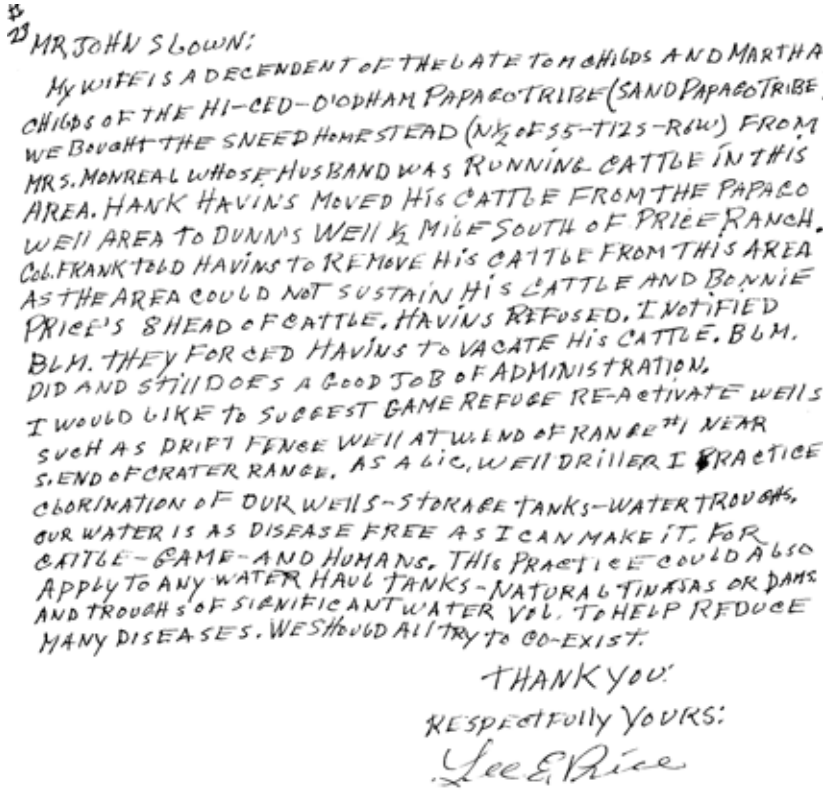
Please consider our actions in terms of long term impact. Consider what we will leave for future generations. The area should be managed for long term health of the watershed, the pronghorn antelopes and other wildlife.
The education that the Visitors Center offers should be designed to increase the ability of visitors to support the stewardship of the Cabeza Prieta National Wildlife Refuge. Along with exhibits about the wonders of the region, there should be exhibits on invasive plants and other sources of habitat destruction.
Neighboring agencies and tribes such as the Border Patrol and the Tohono O'Odham nation should be included in the education programs to minimize their impact there on archaeological sites and natural habitat.

To protect the ecological health of this area adequately, I support the USFWS's eco-system approach (see their draft EIS/CCP) to connect the various habitats with wildlife corridors. To do this many existing tracks should be closed. While it makes sense at times to provide water for wildlife, there is a downside to this. The lowest limit of water development should be the aim in this region to minimize the negative impact of roads on wildlife habitat.

Archaeological areas need more protection. Tracks and trails closed should not direct people toward these areas. These areas merit regular monitoring by law enforcement officers on foot. Foot patrol is important because otherwise tracks are created that lead people to the sites.

A program to deal with invasive species must be in the final document. The longer we wait, the more we habitat we risk losing.
I support the refuge's continuation of removing new populations of invasives like fountain grass by hand and the inspection of vehicles, equipment and clothing for seeds or plant matter prior to entering the refuge to limit the spread of exotic plants.
I support revegetation efforts. To maintain this area's genetic heritage, seed should be collected only from the refuge for the revegetation nursery and the plant nursery for revegetation should be in a non-wilderness area.

Thank you
Deb Sparrow
inksparrow@usa.net
1715 S La Rosa Dr Tempe AZ 85281
(480)968-7908
(active member of the Maricopa County Master Gardener and Master Watershed Steward programs)



MR JOHN S LOWN:

My WIFE IS A DECENDENT OF THE LATE TOM CHILDS AND MARTHA CHILDS OF THE HI-CED-DIODHAM PAPAGO TRIBE (SAND PAPAGO TRIBE) WE BOUGHT THE SNEED HOMESTEAD (N½ OF 35-T12S-R6W) FROM MRS. MONREAL WHOSE HUSBAND WAS RUNNING CATTLE IN THIS AREA. HANK HAVINS MOVED HIS CATTLE FROM THE PAPAGO WELL AREA TO DUNN'S WELL ½ MILE SOUTH OF PRICE RANCH. Col. FRANK TOLD HAVINS TO REMOVE HIS CATTLE FROM THIS AREA AS THE AREA COULD NOT SUSTAIN HIS CATTLE AND BONNIE PRICE'S 8 HEAD OF CATTLE. HAVINS REFUSED. I NOTIFIED BLM. BLM. THEY FORCED HAVINS TO VACATE HIS CATTLE. BLM. DID AND STILL DOES A GOOD JOB OF ADMINISTRATION.

I WOULD LIKE TO SUGGEST GAME REFUGE RE-ACTIVATE WELLS SUCH AS DRIFT FENCE WELL AT W. END OF RANGE #1 NEAR S. END OF CRATER RANGE. AS A LIC. WELL DRILLER I PRACTICE CHLORINATION OF OUR WELLS-STORAGE TANKS-WATER TROUGHS. OUR WATER IS AS DISEASE FREE AS I CAN MAKE IT. FOR CATTLE-GAME-AND HUMANS. THIS PRACTICE COULD ALSO APPLY TO ANY WATER HAUL TANKS-NATURAL TINAJAS OR DAMS AND TROUGHS OF SIGNIFICANT WATER VOL. TO HELP REDUCE MANY DISEASES. WE SHOULD ALL TRY TO CO-EXIST.

THANK YOU.

RESPECTFULLY YOURS:

Lee E Price

August 14, 2005

Thanks, John, for sending the info. We were on the road and would not have had a chance to "comment" without your splendid cooperation to provide the copy. Maybe my oversimplified observation(s) will ease the pain in your monumental (and never ending) task(s)(s)(s).

Analysis paralysis. The first 30 pages vividly expose limitations, restrictions, requirements, regulations, taboos and no-no's mandated by the "Guidance Used for Preparation of a Draft CCP/EIS" in paragraph 1.11.4. If FWS sticks to everything allowed/not allowed, then not much will ever come of all the plans (verb) in the Plans (noun).

I've harped at Tom Baca, for 15 or so years, to allow access on the Cabeza so staff, other agency people and the public could get out there and do what should be done. The one most limiting and unreasonable action was/is to require 4 wheel drive vehicles on authorized roads and the Camino. That happened when the not-too-smart wilderness designation was made.

That having been said, my "helpful(?) offering(s)" can be fairly brief.

It's easy to sit in an office and "plan" resource management. Implementation requires on-site action. Before any management

can occur, the resources must be inventoried (access) is necessary. If the planned actions are to be done (access) is necessary. Monitoring (access)conditions will cause plans to change and require revision. We're back to square one - now we have to up-date the resource management "plan". New inventory, needed actions, etc. etc. etc..all requiring (you guessed it) access.

The Draft(s) allow minimum requirements analysis (MRA) on some site specific activities in area(s) of wilderness. That appears to cover about anything "management" would determine necessary to accomplish the Refuge mission, goals, objectives and any other wild

haired scheme - on or off wilderness areas. Redneck legalese would call it "loophole".

The recent drought has all but eliminated the Pronghorns. A lot of that was brought on by the SP railroad, US highway 80 and subsequent damming of the Gila River and it's tributaries. Now, the wilderness limitations prevent any reasonable attempt to provide relief for the endangered species and other fauna. (Maybe we should get the tree huggers to hand carry water out there in self-destructing, ecologically safe, low cholesterol, sodium free, soluable bags??).

Thanks again for providing the Draft. Good luck with the illegal immigration situation if you're only hiring 3 enforcement personnel as shown in the alternatives. (Brief? Yeah!!)

John F. Colvin, Jr.
3619 S. Pitahaya Drive
Yuma, AZ 85365-4508
((28)783-3686

Comments of Kevin O. Berry, Luke Air Force Base, USAF, August 17, 2005			
Page	**Paragraph**	**Line**	**Comment**
9	1.5.2		Last 3 sentences of the section are awkward and/or inaccurate. The 1994 MOU between USAF, USN and the Interior does not specify removal of military structures on the CPNWR by the year 2017. Regarding ground instrumentation sites PL 106-65 specifies upgrades are okay as long as new endevours: "create similar or less impact than the existing ground instrumentation permitted by the Arizona Desert Wilderness Act of 1990." **However, there is a different MOU referenced in other parts of the CCP between USAF, FAA, and the Service, regarding Childs Mountain that may apply, but I don't have a copy to reference.**
9	1.5.2		Last para, 2nd sentence is awkward and implies the 1994 MOU is what enables the military to use the airspace above the refuge. The enabler is the MLWA: Section 3032 (a)(2) states: "use of the Cabeza Prieta National Wildlife Refuge and Cabeza Prieta Wilderness by the Marine Corps and the Air Force to support military aviation training will remain necessary to ensure the readiness of the Armed Forces." The MOU stipulates agreed upon limitations.
9	1.5.2		Third to last sentence which begins "The MOU was signed. . .": Chg to read: "The MOU was signed in 1994, and was specifically authorized in the Act to facilitate governance of military use of the ground and airspace over the refuge wilderness."
20	1.6.6	11	Incorrectly states the MOU limits flights on MTRs to 1500 feet AGL. Flights on MTRs do not have an altitude restriction in the 1994 MOU Ref MOU para 3.
21			Are the 200 - 1500 foot AGL corridors depicted part of your WTIC agreement?
21			The VR-242 and VR-260 corridor is missing.
26			Top Photo caption makes reference to "Black Head", shouldn't it be "Dark Head?"
39	1.13.1.2	4	Change to: ". . . radar facility serves as a civilian and military aircraft tracking . . "
39	1.13.1.2	5	Change to read: " . . . surveillance system for US Customs and Border Protection."
40	1.13.1.3	6	Change to: ". . . and a military hold harmless agreement is required."
	1.13.4.3		Section OBE
44	1.14.1.2	Title	Change "Committee" to "Council" throughout the paragraph. Add right paren to end of (IEC
44	1.14.1.2	1	Change to read: " . . provide a forum to "enhance management of natural and cultural resources on the Barry M. Goldwater Range by teaming various state and federal agencies into a collaborative management council."
44	1.14.1.2	5	Chg to: "The BEC meets approximately 6 times a year, with subcommittees such as the Pronghorn Recovery Team meeting as required." Delete line beginning with "Subcommittees include . . .
45	1.14.1.2	3	Delete entire last paragraph of this section, and add a section on IEC (see below input)

45	new sec #		Add new section on IEC: "The 1999 MLWA mandated the formation of an Intergovernmental Executive Committee (IEC) solely for the purpose of exchanging views, information, and advice relating to the management of the natural and cultural resources of the BMGR. The IEC is established by memorandum of agreement between the secretaries of the Air Force, Navy and Department of the Interior and is comprised of selected representatives from interested Federal agencies, as well as at least one elected officer (or other authorized representative) from State government and at least one elected officer (or other authorized representative) from each local and tribal government. The IEC convenes 3 times each year and meetings are advertise to solicit public participation. Meeting locations rotate to maximize opportunity for interested public and local jurisdictional participation. The IEC provides a forum for public groups and private citizens to express their views regarding the management process.
56	2.1.1.5	4	This paragraph seems OBE, as written, and needs to be updated with current forage enhancement area information.
70	2.2.3.1	5	Chg to read: " . . . Gila Bend Air Force Auxiliary Field . . south of Gila Bend"
70	2.2.3.1	6	Delete sentence beginning with "Upon obtaining . . ." Add new sentence reading: "In accordance with their permit materials, visitors must make contact prior to each entry, and upon exit from permitted areas."
70	2.2.3.1	8	Chg sentence beginning " The current refuge . . " to read: " . . . serves as a military hold harmless agreement, in case of injury caused by military debris or activity."
83	2.3.3.1		All the same changes as for section 2.2.3.1
94	2.4.2.7	5	PL 106-65 sec 3032(c) extends the MOU to MLWA termination. Where does the year 2018 come from?
108	2.5.2.7		Same comment as for 2.4.2.7, above.
132	Table 2.8	Row labled "Mil. Use"	Change to read: "Limited to provisions stipulated by PL 106-65, Title XXX, including maintenance of communications infrastructure, over flight, and occasional area access restrictions in the interest of public safety."
161	Table 3.3		Why is 12 fawns per 100 does above normal (row 1) while 14 fawns per 100 does below normal (row 6)?
165	3.5.3.1.1.3.5	1	Chg sentence to read: "The BMGR is the nation's third largest military reservation for air-to-air and air-to-ground gunnery training. It is a national security asset for developing and maintaining the aerial combat readiness skills of tens of thousands of pilots since 1941.
165	3.5.3.1.1.3.5	4	Chg sentence ending to: " . . . jurisdiction of the Air Force for the east portion, and the Navy for the west portion."
165	3.5.3.1.1.3.5	10	Chg sentence that begins with "However" to "Though unlikely, injury to pronghorns could occur . . ."
165	3.5.3.1.1.3.5	25	Chg end of the sentence that begins "The EOD clearances . ." to ". . . and can take up to several weeks.
165	3.5.3.1.1.3.5	26	Chg the phrase ". . . are driven across the desert at intervals. . ." to "are driven in the required clearance zones around target areas at intervals . . ." ("across the desert" seems too capricious and arbitrary)
165	3.5.3.1.1.3.5	30	Delete the word "courses" after the word "WTI"
165	3.5.3.1.1.3.5	34	Delete the words " . . .from east west to east." (Aircraft go both ways.)
165	3.5.3.1.1.3.5	39	Add last sentence: "Overall, it is determined that "there is a net benefit to endangered species from the presence of the Goldwater Range and the mitigation measures that have been put in place by the military." (2004 National Defense Authorization Act congressionally appointed BMGR endangered species task force.)"
193	3.7.2	7	CPNWR acre reference of 803,418 is not the same as acreage listed in other sections

194	3.8.2	4	Chg end of 2nd sentence to read ". . . all other facilities were removed."

The Robinsons
1795 Houston Road
Phoenix, Oregon 97535
August 15, 2005

US Fish & Wildlife Service
Attn: John Slown
PO Box 1306
Albuquerque, NM 87103

Dear Mr. Slown:

Please consider our comments which follow concerning the draft plan for Cabeza Prieta National Wildlife Refuge. Although we live far from your area, we live near the Klamath refuges, Hart Mountain and Sheldon. Their wildlife and wildlands are a great asset of living here. It is commendable that 800,000 acres of Cabeza has been designated by Congress as wilderness, as that will give it the best possible protection.

Sonoran Pronghorn – Continuing the use of developed water sources inside the Cabeza Wilderness is acceptable because it is required by the recovery plan adopted under the Endangered Species Act.

- We support the language of Alternative 4 on this point, with the addition of language from Alternative 3 calling for more collaboration with adjoining BLM and military land managers to provide water outside the refuge and to expand pronghorn range.
- A requirement should be added to re-evaluate the use of artificial water sources when recovery goals have been met.

Desert Bighorn Sheep – We favor the Proposed Alternative to redevelop the existing water sources for desert bighorns. Methods should continually be sought to reduce the unnatural impacts of these waters. The question of whether these water sources are still necessary and helpful to the bighorns should be evaluated at regular intervals.

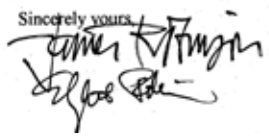
Closure of Administrative Trails – We favor closure of all unnecessary administrative trails, so the habitat can recover. We like language in the Proposed Alternative that envisions closure of all administrative trails at such time as water hauling is no longer necessary.

Managing Visitor Access – The Proposed Alternative is deficient in two respects:

- We believe it is a mistake to allow vehicles to travel anywhere in a 100-foot wide corridor on El Camino del Diablo, Christmas Pass Road, and Charlie Bell Road. Vehicles should remain on a clearly demarcated roadway and not be allowed to create new impacts radiating out from the existing route.
- Language should be added clearly prohibiting off-road vehicles such as ATVs, motorcycles, and three-wheelers. If you allow them on refuge roads, you will not be able to prevent them from going off-road and creating new impacts.

Thank you for considering our thoughts on this plan.

Sincerely yours,



August 25, 2005
Dear Mr. Slown:

Please accept these comments on the Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan. I care about the protection and management of the Cabeza Prieta National Wildlife Refuge and its resources.

With 93% of its lands designated wilderness, the Refuge represents the largest wilderness area in Arizona. The Cabeza Prieta region has outstanding ecological, geological, cultural, and educational values. The area is threatened by illegal off-road vehicle activity, invasive/exotic vegetation, habitat degradation, and border traffic funneled into the refuge by increased border enforcement activities at other points of entry along the US-Mexico border.

I encourage the U.S. Fish & Wildlife Service (USFWS) to support the strongest protection of wilderness and wilderness values for the Cabeza, a minimalist approach to water developments in wilderness, and the actions that will best protect Sonoran pronghorns and all other wildlife on the refuge. I encourage the USFWS to select and implement Alternative 2, but to also include elements of Alternatives 3 and 4 as well. Alternative 2 affords the greatest protection for wilderness and over the long term provides greater protection for all of the Cabeza's wildlife.

Thank you for considering my comments.

Nancy Hicks
11170 N. Canada Ridge Dr.
Oro Valley, AZ 85737
Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

None of the five alternatives in the draft comprehensive Conservation Plan (CCP) for the Cabeza Prieta National Wildlife Refuge protect the outstanding wilderness values in the refuge from the very motorized use you acknowledge is damaging them. The agency's disregard for the Wilderness Act of 1964 and your tolerance for vehicular use in the refuge's designated wilderness are appalling.

Desert bighorn sheep management is the cited reason for most of the FWS's continued motorized use in designated wilderness, specifically using heavy trucks to haul water. As the plan acknowledges, the service has no science to support the notion that artificial water developments are necessary for the conservation of desert bighorns. These creatures evolved and survived without water trucks in a harsh desert environment.

Despite this, all five alternatives would continue the practice of driving in wilderness to supply water to impoundments. That motorized use disturbs wildlife and causes other irreversible damage to wilderness resources. The FWS has done virtually nothing to analyze or understand the impacts of this activity or to develop a science-based plan for managing the sheep. Continued water hauling is inexcusable and the final CCP should halt it.

The single most damaging activity in the refuge and its wilderness is border law enforcement. While I recognize and respect the challenges the Border Patrol faces, I also firmly believe we must not squander our wilderness in pursuit of other aims. It is inappropriate, and probably illegal, to open vast sections of the refuge's wilderness to unlimited vehicular use and road building. The draft CCP acknowledges the damage from this use in the refuge, but goes on to say that the issue of border law enforcement is "outside the scope of the CCP." If the most damaging activity in the refuge falls outside a Comprehensive Conservation Plan's scope, what could possibly fall within it?

We look to the FWS to manage this spectacular refuge and its resources for all Americans. We deserve more than silence from your agency on this critical issue. Please adopt a management plan that protects the refuge wilderness by working with the Border Patrol to bolster law enforcement at the border itself and by eliminating all vehicular use in designated wilderness areas.

Thank you for your consideration.

Sincerely,

Ilona Lindsay
9842 49th Avenue S.W
Seattle, Washington 98136

29

Patrick Huber
721 E. 11th St.
Davis, CA 95616

Dear USFWS:

I am writing in regards to the Cabeza Prieta CCP. As a one time resident of the Sonoran Desert backcountry, I can personally attest to the beauty, biological richness, and wildness of this place. It is thus disheartening to learn of the alternatives presented in the draft CCP for this Refuge. Cabeza Prieta is at the core of one of the great wildlands complexes remaining in continental United States (and northern Mexico). It should be managed as such.

One major issue (not only here but in many other desert conservation areas) is the importation of water into remote areas for use by wildlife. This ecosystem managed to thrive very well on its own without these subsidies; there is no reason to suggest that this would not be the case in the future. The Refuge should be managed in such a way as to most closely adhere to a hands-off policy; this does not include driving trucks through otherwise wild areas to drop off water.

An even larger issue involves the use of the Refuge by the Border Patrol. While there is a national discussion currently about illegal immigration, this does not mean that this factor is outside the scope of the CCP. Use of the Refuge by motorized Border Patrol is the most pressing problem in the Refuge and needs to be addressed in any useful management plan.

Cabeza Prieta is the heart of one of the largest wildland complexes in the U.S. Please adopt a management plan that reflects this.

Sincerely,

Patrick Huber

30

George & Frances Alderson
112 Hilton Avenue
Baltimore, Maryland 21228

September 1, 2005

Mr. John Slown
US Fish & Wildlife Service
PO Box 1306
Albuquerque NM 87103

Dear Mr. Slown:

Please include this letter as our comment on the Draft Comprehensive Conservation Plan for Cabeza Prieta NWR. Early in my career I (George) worked for a former manager of Cabeza and I heard a lot about the refuge. We thank you for sending us the draft CCP, and we submit the following comments.

Artificial Waters: The CCP goes far beyond the realm of reason in the use of artificially developed water sources for bighorn sheep and Sonoran pronghorn. None of the alternatives is acceptable, because they continue the use of heavy trucks and helicopters to haul water within the designated wilderness areas. Some alternatives would install even more artificial waters. This part of the CCP should be rewritten from scratch, with a phase-out of water hauling by a date certain.

Apparently FWS believes the hauling of water is authorized by language in the Wilderness Act allowing installations and motor vehicles: "as necessary to meet minimum requirements for the administration of the area for the purpose of this Act." That is a big mistake. The CCP goes far beyond "minimum requirements." Your Minimum Requirement Analysis procedure does not stick to the limitations set by the Wilderness Act.

It appears that in a drive to increase populations of bighorn and pronghorn, FWS has gone beyond natural ecosystem management and moved into a more active form of management. (The latter is typical of intensively managed refuges, where many tools are used to increase the populations of key species such as ducks and geese.) Cabeza Prieta is supposed to be a natural ecosystem, managed as wilderness. If natural water can support a certain population, that should be the target population – not some higher figure that depends upon artificial water sources.

We do not object to hunting of bighorns in the refuge. However, the interest of hunters in building up the bighorn population may be putting pressure on FWS to set targets larger than the natural population the refuge can support without artificial intervention. That pressure should be resisted. Please put the natural ecosystem as top priority.

Border Law Enforcement: The CCP reveals that serious impacts are being caused by illegal immigrants and US border law enforcement activities. The map at page 218 shows some 30 illegal vehicle routes crossing through the wilderness area. Yet the CCP claims that any measures to reduce these impacts would be "beyond the scope" of this plan.

We favor the work of the US Border Patrol, and we have written to them urging closer cooperation with FWS. Please include measures in the final CCP to prevent further incursions and to erase the impacts already in place in the refuge. We would like to see law enforcement focused more intensively at the border itself. This would cut down on illegal traffic and obviate pursuit by law enforcement vehicles in the wilderness areas.

Administrative Roads: You now have 145 miles of administrative trails within wilderness areas. These should be reduced to a bare minimum, below the level proposed in any of the alternatives. The 85 miles allowed in Alternative 2 is still too much.

Childs Mountain Site: We favor phasing out the communication towers and related facilities on Childs Mountain by the year 2018, as proposed in the CCP (page 499). Removal of these obtrusive structures would be a big step toward restoring the natural landscape.

Visitor Center: We favor the plan to expand the refuge visitor center in Ajo to provide better interpretative exhibits and materials (page 506). The center should show the public what the refuge is doing for wildlife and point to appropriate ways of visiting the refuge to see its wildlife and to appreciate the extraordinary Sonoran desert habitat that is protected by the refuge.

Thank you for considering our views.

Sincerely,

George & Frances Alderson

George & Frances Alderson

Dear Mr Slown,
None of the 5 alternatives in the draft Comprehensive Conservation Plan (CCP) for the Cabeza Prieta National Wildlife Refuge protect the wilderness ~~there~~ from the motorized use that you acknowledge is damaging it. Your tolerance for vehicular use in the wilderness areas of the refuge is very harmful to the wild creatures there. Please halt water hauling into wilderness! Please eliminate all vehicle use in designated wilderness areas! Lillian Light

John Slown, Division of Planning
NWRS R-2
U.S. Fish & Wildlife Service
Albuquerque, NM 87120

Dear Mr. Slown:

Please accept these comments on the *Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan.* I care deeply about the protection and management of the area and its resources.

With 93% of its lands designated wilderness, the Cabeza Prieta National Wildlife Refuge represents the largest wilderness area in Arizona. The Cabeza Prieta region has outstanding ecological, geological, cultural, and educational values. The area is threatened by illegal off-road vehicle activity, invasive/exotic vegetation, habitat degradation, and border traffic funneled into the refuge by increased border enforcement activities at other points of entry along the US-Mexico border.

I encourage the U.S. Fish & Wildlife Service (USFWS) to support the strongest protection of wilderness and wilderness values for the Cabeza, a minimalist approach to water developments in wilderness, and the actions that will best protect Sonoran pronghorns and all other wildlife on the refuge. I encourage the USFWS to select and implement Alternative 2, but to also include elements of Alternatives 3 and 4 as well.

I support Alternative 2 because it affords the greatest protection of wilderness and wilderness characteristics of the Refuge. It means less water hauling (page 243) and less administrative use of travelways in the wilderness. I support the closure of 60 miles of administrative tracks open on the refuge. Roads disturb and fragment habitat and roads do not belong in wilderness. (Alternative 2) I also support the minimization of developed water catchments in the wilderness. Keep it natural, undeveloped and maintain outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Please work to minimize the effects of exotic plant species by limiting soil disturbance, working with Mexico, and working to revegetate with native vegetation areas that have been disturbed. I also encourage the USFWS to protect cultural resource areas from damage due to unauthorized entry. Periodic patrolling by refuge law enforcement officers will help avoid damage and discourage unauthorized entry to these sensitive areas (Alternative 4). Under current actions, sites are only checked for damage if they are near an area that is being monitored for a different project and no record is being kept on what damage, if any, is found. I support periodic patrolling under conditions where USFWS specifies exactly how these patrols will be done. If patrols can be done with minimal effect on wilderness, including by foot or horse in the wilderness, I suggest that the refuge staff take an initial inventory of all known sites so that references can be made on how much damage is occurring in these areas (issue not present in any of the proposed alternatives).

Please keep me informed on any developments relative to this planning process. Thank you for considering my comments.

Sincerely,

Robert L. Goyen

August 28, 2005

Dear Mr. Slown,

We are emailing today to urge you to use your position to protect a very important wildlife area, the Cabeza Prieta National Wildlife Refuge . This area represents a rare gem of wilderness - your leadership is critical. Support for preservation is widespread and impacts all aspects of our society from the education of our children and the strength of our tourism. According to the Scottsdale Visitor Bureau, our wilderness NOT golf (or anything else) draws visitors to this state.

This wilderness is a model for future restoration, it gives our wildlife a rare opportunity to thrive, and is a gift to every future generation.

Please keep our future in the forefront of every decision you make regarding this unique area.

Best regards, the Whitehead Family

Michael & Solange Whitehead
Lynelle, Derek, Bethany (Age 12, 10, 5)
13281 N. 99th Place
Scottsdale, AZ 85260
(480) 614-8483

August 29, 2005

Dear Sir, I am a conservative Arizona Republican who is opposed to building one new road anyplace in the Continental North Americas and South America.

Cal Lash
2904 E Desert Lane
Phoenix, Arizona
18005606532

August 30, 2005

Don't go through this horrible plan.

Ann MacDonald.

August 30, 2005
Mr. John Slown, Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

As a private citizen who loves the desert I am deeply disturbed by the disruption of wilderness areas by Border Security. This National Wildlife Refuge, the Cabeza Pieta, needs immediate protection. Vehicular use is damaging its pristine areas. The vegetation is delicate and cannot withstand such ravages. Also, to my knowledge, there is no reason to haul water to the bighorn sheep and no research to support the use of vehicles to do this. These creatures have adapted to harsh desert life and it is damaging to the terrain to run these vehicles.

The agency has disregarded environmental protections that were established to take care of the issue of protecting our desert wildlife and faun and the environment in which they flourish. If you do not heed the warnings and letters such as mine, then the country that is desert will wind up deserted of all that survives in this ecological niche.

I visited the Desert in Bloom in Anza Borrego this year and it was an incomparably beautiful experience. I never saw so many wildflowers. The desert was a magic carpet!

Please heed the letters such as mine that are coming your way. We write because we care and I know that wilderness is truly the "Preservation of the World" as Thoreau wrote so eloquently some years ago.

Thank you for your consideration,

Sincerely,
Ruth Housman
64 Homer Street
Newton Centre, Massachusetts 02459

August 30, 2005
Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

Over 90 percent of the Cabeza Prieta National Wildlife Refuge in far southern Arizona is designated wilderness. Yet - to my shock - the U.S. Fish and Wildlife Service has been playing fast and loose with this wilderness area, allowing its own and the Border Patrol's vehicles to range through it.

I urge you to adopt a management plan that that will protect this refuge wilderness, by working with the Border Patrol to bolster law enforcement at the border itself and by eliminating all vehicular use in designated wilderness areas.

Thank you for your consideration.

Sincerely,

Kellie Cremer
312 W. Prospect Rd. #163
Fort Collins, Colorado 80526

August 30, 2005

Dear Mr. Slown:
None of the five alternatives in the draft comprehensive Conservation Plan (CCP)for the Cabeza Prieta National Wildlife Refuge protect the outstanding wilderness values in the refuge from the very motorized use you acknowledge is damaging them. The agency's disregard for the Wilderness Act of 1964 and your tolerance for vehicular use in the refulge's designated wilderness are appalling.
Please adopt a management plan that protects the refuge wilderness by working with the Border Patrol to bolster law enforcement at the border itself and by eliminating all vehicular use in designated wilderness areas.

Sincerely,
Elaine Bernard

August 30, 2005

Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

I was disappointed to learn that your draft comprehensive Conservation Plan for the Cabeza Prieta National Wildlife Refuge does not protect this refuge from the damaging effects of motor vehicles. I was only 13 years old when the Wilderness Act of 1964 became law, but first of all, I would have expected the Fish and Wildlife Service to have already studied the impact of using heavy trucks to haul water, and to have by now discovered a better plan for meeting the needs of desert bighorns. Second, I would especially have expected you to protect this area from the border law enforcement activities that damage it. The Border Patrol certainly has its problems, which I realize our federal policy makers have not adequately addressed. But does that make it right to allow roads and vehicles in an area that has been specifically protected by law? Wouldn't it be smarter for the Fish and Wildlife staff to work WITH the Border Patrol in a joint effort to strengthen law enforcement right at the border and eliminate vehicles in designated wilderness areas?

I hope that you will think again about your responsibilities in this area. I really think you could do better, and I thank you for reading and considering my comments.

Sincerely,

Helen Hanna
183 Gifford way
Sacramento, California 95864-6907

August 30, 2005

Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquerque, NM 87103

Dear Mr. Slown,

I was born in Douglas, Arizona, in 1924, and lived, was educated, and spent all of my working life as an Episcopal priest in Cochise and Pima Counties. I have loved the great Southwestern Desert all of my life, and taken special enjoyment from its vast silence, serenity, and its opportunities for being alone. A particular center-piece in the string of beauties in the Southwest is the magnificent Cabeza Prieta Refuge in Southern Arizona. Its terrible mis-use by trucks and other motor traffic have begun to change the entire character of what has made the Cabaza Prieta Refuge area the marvelous place of beauty it has been for my long life and for the long centuries before that. It is clearly being abused through a failure of responsibility by the very authorities who have been charged with its protection. That abuse must stop before the degradation of the area has gone beyond saving. Yours is the agency charged with its protection. I trust you will undertake a new look at your reponsibilities for your trust, and that the next time I re-visit the lands of my birth, my youth, my years of active work, I will find the same peace and quiet beauties I have been accustomed to in past decades. With thanks for letting me speak my mind on this issue which lies within your official duties, I am

Sincerely,

The Rev. Canon John C. Fowler
417 South Main St.
Nazareth, Pennsylvania 18064-2713

August 30, 2005

Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquerque, NM 87103

Dear Mr. Slown,

Your agency's disregard for the Wilderness Act of 1964 and your tolerance for vehicular use in the refuge's designated wilderness are outstanding. It is time to defy the enviro extremists in this country. Large Wilderness areas without liberal access, including vehicular, are of little value to average Americans. Wilderness areas should be "many" and "small".

We look to the FWS to manage this spectacular refuge and its resources for all Americans. We deserve more than silence from your agency on this critical issue. Please adopt a management plan that opens the refuge wilderness by working with the Border Patrol to bolster law enforcement at the border itself and by promoting most vehicular use in designated wilderness areas.

Thank you for your consideration.

Sincerely,

Kent Collier
205 Main St.
Savannah, Tennessee 38372

August 31, 2005

Dear Mr. Slown:

None of the five alternatives in the draft comprehensive Conservation Plan (CCP) for the Cabeza Prieta National Wildlife Refuge protect the outstanding wilderness values in the refuge from the very motorized use you acknowledge is damaging them. The agency's disregard for the Wilderness Act of 1964 and your tolerance for vehicular use in the refuge's designated wilderness should be reconsidered.
Sincerely,

Molly McCarty
2838 S. 9th Place
Milwaukee, WI 53215

August 31, 2005

Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

Please adopt a management plan that protects the Cabeza Prieta National Wildlife Refuge by working with the Border Patrol to bolster law enforcement at the border itself and by eliminating all vehicular use in designated wilderness areas.

Thank you for your consideration.

Sincerely,

John Boylston
4123 Cobblestone Pl
Durham, North Carolina 27707

August 31, 2005
Please do your utmost to ensure that the desert is protected. ATV's in wilderness areas are not cool.
Mark J. Fiore

August 31, 2005
Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

The draft comprehensive Conservation Plan (CCP) for the Cabeza Prieta National Wildlife Refuge fails to protect the outstanding wilderness values in the refuge from the very motorized use you acknowledge is damaging them. The plan's tolerance of vehicular use in designated wilderness violates the spirit and the letter of the Wilderness Act of 1964.All five alternatives in the draft would continue the practice of driving in wilderness to supply water to impoundments for bighorn sheep, disturbing wildlife and damaging resources despite the fact that no science confirms the need for these trips. More appallingly, vast sections of the wilderness will be opened, without legal foundation, to unlimited vehicular use and road building in the name of border law enforcement, which the document says is "outside the scope" of the Conservation Plan. If it's outside the scope of the plan, then the Fish and Wildlife Service might just as well close down and go home. The draft simply abandons the agency's responsibility to manage. Please adopt a management plan that protects the refuge by eliminating vehucular use in the designated wilderness areas.

Sincerely,
Peter Steinhart
717 Addison Ave.
Palo Alto, California 94301

September 1, 2005

Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

None of the five alternatives in the draft comprehensive Conservation Plan (CCP) for the Cabeza Prieta National Wildlife Refuge protect the outstanding wilderness values in the refuge from the very motorized use you acknowledge is damaging them. Your agency's disregard for the Wilderness Act of 1964 and your tolerance for vehicular use in the refuge's designated wilderness are appalling.

Actually you could try a real legacy for your term as steward and simply pave the whole place. That way you can try your "wildlife managment" practices with out the dust and other inconveniences of a true desert.

Get out ahead and Lead > >Do a real service in protection of these wild areas - or pave it under. You know whether you are being a real steward or a weak little pawn.

Sincerely,

A.G. Flynn
6403 Bonner Dr
Vancouver, Washington 98665

September 2, 2005

Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

How come the plan doesn't protect wilderness?

It's crazy to justify vehicles in wilderness by saying there is a need to haul water for desert animals. Piss poor excuse to keep roads open, denigrating wilderness.

Furthermore, it is wrong to open huge portions of the wilderness areas to road building to control Mexican illegal immigrants! Controlling immigrants is NOT a higher priority than protecting our public lands.

Thank you for your consideration of my comments. I expect wilderness will come out better in your final plan.

Sincerely,

S. Lee Stone
6607 Willamette Dr.
Austin, Texas 78723

September 7, 2005

We generally favor alternative 2 and are especially interested in the endangered Sonoran Pronghorn and the invasion of exotic plants and off road vehicles. Having attended a conference on water catchments @ ASU a few years ago, I question the efficacy of these artificial impoundments. Predators tend to hang out there as do disease organisms. I wonder what the wildlife did before we came along?

Off road vehicles and exotic plants are somewhat synonymous, the former providing the disturbance for the invasion of the latter. Please limit vehicles to existing roads, which appear to be too abundant already. Also please continue and expand the current activities to remove exotic plants.

Thank you,
Frank Welsh, P.E. J.D.
Barbara Blackman

TONOPAH AREA COALITION
20 NORTH 350TH AVENUE – TONOPAH, AZ 85354

7 September 2005

To: John Slown
Division of Planning, NWRS R-2
U.S. Fish & Wildlife Service
PO Box # 1306
Albuquerque , NM 87120 .

Please consider the following suggestions as you develop a management plan for the Cabeza Prieta.

Sonoran Pronghorn

- Reevaluate the necessity, development, and use of surface water cachements for Sonoran pronghorn. These cachements are not a desirable wilderness management tool because they mimic water supplies pronghorn would use in captivity, not in natural, wild habitat. Research and document the positive and negative effects of providing unnatural sources of water to pronghorn, as well as how the effects of motorized travel corridors, both inside and outside wilderness, disrupt the natural hydrologic cycles (sheet flow) supplying water to vegetative cover and forage upon which Sonoran pronghorn rely.
- Restore wildlife movement corridors across highway 85 and remove all fences that could prohibit movement of Sonoran pronghorn. The pronghorn recovery team has made it clear that reestablishing movement between habitats is crucial to the recovery of the Sonoran pronghorn.

Desert Bighorn Sheep

- Redevelop existing water tanks in wilderness to improve their capacity and collection systems, as well as making the tank levels more apparent from the air. Explore the feasibility of using photovoltaic systems to monitor and remotely transmit water levels.
- All management activities proposed/performed in wilderness should be evaluated for need and method of completion under a Minimum Requirements Analysis. As with Sonoran pronghorn, the USFWS should fully explore and document the relationship between desert bighorn sheep and the necessity, use, and effect of water tanks on sheep populations.

Invasive/Non-Native Plants

- The visitor orientation video and permit for the refuge should incorporate aspects of educating the public about the spread of noxious weeds and how to prevent it.
- Border Patrol vehicles that are used along various locations of the border should be cleaned periodically and after traveling in heavily infested areas before entering the refuge.

Interpreting Cultural Resources

- Intertwine the management of cultural resources and the implementation of an environmental education program. Stories of the past cultures that inhabited the refuge and surrounding area are an integral part of environmental education and cultural awareness.
- USFWS should work closely with the Tohono O'odham and other native tribes along the Colorado River to document and share their ancestor's use of the land, myths, and rituals. Understanding cultural resources is integral to the desire to protect them.

Administrative Trails

- Roads disturb and fragment habitat and they do not belong in wilderness. USFWS must continue to explore ways in which it can complete the necessary management actions without developing new roads.
- Close unnecessary administrative trails in the wilderness. Retain the language in the preferred alternative under this section that allows permanent closure of all administrative trails if water hauling is deemed no longer necessary.

Leave No Trace

- Implement a Leave No Trace program not only at the refuge office, but also in the backcountry and along motorized travel corridors to help the public understand the fragility of desert resources.
- Law enforcement officers should be trained and encouraged to interact with the public and offer information about Leave No Trace and the natural resources of the refuge.

Managing Visitor Access

- The preferred alternative is not acceptable. Any motorized corridor of 200 feet should only allow visitors to travel on established roadways and to pull off only as far as needed to allow other vehicles to pass. There should not be a blanket 100-foot wide corridor. Group sizes on refuge roads should be limited to 5 vehicles per party and 16 people.
- The current permit process should be kept in place and not moved to a phone or web based system. Pack stock should continue to be allowed under special use permits.
- The preferred alternative should clearly prohibit Off Road Vehicles such as four wheelers, motorcycles, and three wheelers from operating in refuge wilderness.

Thank you for the opportunity to comment,

Judith Shaw

September 8, 2005

My comments are regarding the proposed Stewardship Plan, EIS, and CCP. I am concerned about how the refuge will be managed and cared for in the future. Since the land and the wildlife there cannot speak for themselves, we, the public, must speak on their behalf.

My opinion is:

1. Roads do not belong in wilderness. USFWS should explore ways to maintain the refuge without building new roads. Instead, retain the language in the preferred alternative under the section for Administrative Trails, allowing the permanent closure of all administrative trails if water hauling is no longer necessary.

2, Reevaluate the use of surface water cachements for Sonoran pronghorn and desert Bighorn Sheep and the effects of motorized travel corridors that disrupt the natural water supply to vegatative cover and forage upon which pronghorn rely. Remove all fences that prohibit movement of Sonoran pronghorn. The movement of pronghorn is crucial to recovery.

3. Leave No Trace is a program that needs to be implemented not only at the refuge office but also in the backcountry and along motorized travel corridors to help the public understand the fragility of desert resources. This also includes the training of law enforcement officers who should be encouraged to interact with the public and educate the users about the Leave No Trace program and the natural resources there.

4. Visitor access should be limited to 5 vehicles per group and only 16 people in the group. The preferred alternative is not acceptable. There should not be a blanket 100-foot wide corridor. The current permit process should be kept in place. Off Road Vehicles should be prohibited in this wilderness.

5. Cultural resources must be protected, therefore an environmental education program should be implemented with the assistance of local Native American tribes. Understanding cultural resources is integral to the desire to protect them.

6. Implement a program to inform the public about the spread of invasive/non-native plants into the wilderness.

Thank you for the opportunity to make my comments. I am a life long resident of the Southwest and have lived all my life from Texas to New Mexico, Arizona, and California. I am also a school teacher and the wilderness areas are part of my classroom.

Helena Quintana
1726 Brighton Ave. #A
El Centro, CA 92243
760.353.7349
helenquintana@yahoo.com

Helena Quintana

...if we remain silent in the face of cruelty, injustice, and oppression, we sacrifice part of our soul. In this sense, we keep on acting because by doing so we affirm our humanity-the core of who we are, and what we hold in common with others. We need to do this more than ever in the current time. --Paul Rogat Loeb

September 8, 2005

Dear Mr. Slown;

I want to add my voice to the many who are deeply concerned for the continued destruction of wilderness quality of the Cabeza Prieta Wilderness Area in Southern Arizona. None of the plans that have been forthcoming so far adequately protect the original conditions of this valuable area, particularly with respect to the criss-crossing with motor vehicles for whatever purposes. The land was set aside as a wilderness. Please take steps to cease those activities that violate the law and destroy the recognized true nature of this area.

Sincerely,

John A. MacDonald Ph. D. (e-mail: j3dmacd@hotmail.com)

751 Newcastle Drive
Akron, OH 44313

52

1762 Belle Court
Millersville, MD 21108
September 3, 2005

John Slown, Biologist/Planner
USFWS, Planning Division
PO Box 1306
Albuquerque, NM 87103

Dear Mr. Slown:

These comments are submitted for consideration on the draft Conservation Plan for Cabeza Prieta National Wildlife Refuge, Arizona. My brother-in-law worked on a project involving this refuge many years ago. Our six children (ages now 6 to 10) love wild country, and we all hope the wilderness of Cabeza Prieta will still be wild when they grow up and explore our beautiful land for themselves.

In 1990 the U.S. Congress passed the Arizona Desert Wilderness Act, championed by the late Representative Morris K. Udall. It designated 93 percent of the refuge (803,000 acres) as wilderness. Stewardship of that wilderness is central in this draft plan.

Water Hauling – None of the alternatives in the draft plan would protect the outstanding values of the wilderness areas, as is mandated by the Wilderness Act. The plan indicates that the wilderness is being violated by repeated, routine use of heavy trucks to haul water to artificial waterholes to benefit desert bighorn sheep and Sonoran pronghorn antelope. Old vehicle routes are being kept open within the wilderness areas for these truck operations. Some alternatives in the plan actually call for increasing the number of water developments. Please reject this approach, and get back to natural conditions. Remember, bighorns and antelope are species adapted to the desert. Please get rid of the water hauling in the final plan, and close most of the 145 miles of "administrative" roads in wilderness.

Border Enforcement – The plan shows many illegal vehicle routes through the wilderness area, but it is not clear how much these are due to law enforcement vehicles and how much to illegal immigrants. Whichever is the case, it is time to get a grip on this problem. The draft plan claims this issue is not up for consideration. It should be! Please work with the Border Patrol to protect these wilderness areas. If effective enforcement activities were concentrated along the border, there could be fewer impacts within the wilderness.

Facilities – We are in favor of an expanded visitor center at refuge headquarters, so the story of this wonderful wildlife area can be told to the public. We support the phaseout of the Childs Mountain communication facilities by the year 2018, as proposed in the plan; this would remove an eyesore and make the area more wild.

Thank you for considering our thoughts. We wish you well in this planning effort.

Sincerely yours,

Betsy Shade MD

MAGIC

Maryland Alliance for Greenway Improvement and Conservation

September 5, 2005

John Slown, Biologist/Conservation Planner
USFWS, SW Region, Planning Division
P.O. Box 1306
Albuquerque, NM 87103

Dear Mr. Slown:

MAGIC submits these comments in response to FWS's request for public input on the draft Comprehensive Conservation Plan for Cabeza Prieta NWR. Having grown up in Sandpoint, Idaho, I write from the perspective of a westerner, although I now live in the East.

Cabeza Prieta is most valuable as a protected example of the Sonoran Desert, with its native ecosystem fully functioning. Congress designated 93 percent of the refuge as wilderness in 1990. The best conservation plan would have human influences minimized and let nature do the job. Management actions may be needed where impacts of past human activities such as grazing, mining or roads have degraded the natural wildlife habitat and wildlife populations.

Regrettably, the draft CCP sanctions a violation of the Wilderness Act's prohibition against motor vehicles in wilderness. This works against protection of the wildlife and its habitat. I urge FWS to rewrite this draft CCP to eliminate motor vehicles from the wilderness insofar as possible within your authority.

Specifically:

1. The hauling of water to 21 artificial water sources for Sonoran Pronghorn and Desert Bighorn Sheep should be stopped altogether. FWS has been badly advised if the idea is that routine, repeated trips by heavy trucks along administrative "trails" in the wilderness can be justified under the "minimum tool" concept based on section 4c of the Wilderness Act. You may be under pressure from hunting groups to maximize the population of bighorns in the refuge, but that doesn't justify violating the Wilderness Act. Nature sets its own population levels, influenced by water naturally available, and these magnificent animals are well adapted to the desert climate.

1007 Aster Blvd.• Rockville •MD 20850
Phone 301-340-8348 • e-Mail: Bobdegroot@comcast.net

Intervening with artificial water is reminiscent of the intensive management used in "duck factory" refuges. It is out of place in Cabeza Prieta, where the primary value is the desert wilderness and all the wildlife found there.

2. The use of vehicles cross-country by the Border Patrol and FWS in law enforcement activities should be curtailed insofar as possible. The draft CCP claims this is beyond the scope of the plan, but that is surely a mistake. A map opposite page 218 shows many unauthorized vehicle routes crossing through the wilderness areas. Action must be included in the final plan to prevent more of these routes from being created, and to restore the natural habitat from past impacts.

   I urge more active consultation with the Border Patrol to find means of avoiding vehicle incursions into wilderness. All the options should be explored: more thorough patrolling along the actual border, erection of more effective barriers at the border, more use of remote sensing, new strategies for apprehending fugitives without using vehicles to pursue them into the wilderness.

The visitor center project at the Ajo refuge headquarters is an excellent idea. It would help inform the public about the great wildlife values of Cabeza Prieta and how to enjoy them under the "leave no trace" concept.

I support dismantling the communications towers on Childs Mountain, as planned in the draft. They should be gone by 2018 under the existing MOU with the Air Force and FAA. The public will thank you for getting rid of an eyesore.

Thank you for considering my thoughts on the CCP for Cabeza Prieta.

Sincerely,

Robert DeGroot

Robert DeGroot
President, MAGIC

September 8, 2005

Dear Mr. Slown:
I am proud of Arizona's Cabeza Prieta and believe the protection of our wilderness and wildlife should be a top priority. I hope you will give this your fullest attention. Our natural resources and wildlife are gifts that should be preserved for us and future generations.

Debra J. White
3301 S. Terrace Road
Tempe, AZ 85282

Debra J. White
The Purpose Driven Writer
www.4-footedfriends.com
"The greatness of a nation and its moral progress, can be judged by the way its animals are treated."
M. Gandhi

September 8, 2005

To John Slown, Division of Planning;

I am an Arizona native born and raised, I feel I'm very lucky to have grown up in an environment of such beauty and wonder. Ever since I can remember I have always had an appreciation for nature, and profound respect for it. I believe that growing up so close to it has a lot to do with that, and the Cabeza Prieta National Wildlife Refuge is a shining gem in our great state because of it's vastness, its plant and wildlife diversity and ability to support them.
But it is fragile, as if made of porcelain if we don't protect it from clumsy hands, it will break; and we will have failed in our task to manage this planet well. If this refuge continues to endure constant off road destruction, illegal dumping, invasive plants, and both the Sonoron Pronghorn and Desert Bighorn sheep water issues aren't addressed, it may no longer be considered a refuge for wildlife. It will become a refuge for garbage and it's former grandeur will be but a memory 20 years from now. Let's not allow that to happen, let's give back to nature as it gives us so much every day in the form of tourism, inspiration, and to allow future generations to appreciate it's value that can only be appreciated in first person.
Thank you for this opportunity to voice my opinion, you guys are doing a good job, and with everyone working to preserve our state's prized deserts and wildlife we can all do better than we ever imagined.
Sincerely,

Jennifer Konrad
7015 South Dunnock Drive
Tucson, AZ 85706

56

1307 Madison Drive
Fort Washington, MD 20744

September 6, 2005

US Fish & Wildlife Service, Planning Division
Attn: John Slown
PO Box 1306
Albuquerque, NM 87103

Dear Mr. Slown:

These comments concern the new draft comprehensive conservation plan for Cabeza Prieta National Wildlife Refuge. I am retired from a career in the United States Air Force, during which I visited Arizona many times on official duty. Cabeza Prieta is a magnificent remnant of the wild Sonoran desert, and 93 percent of it has been designated for preservation as wilderness.

In this plan FWS should end the practice of using motor vehicles to haul water to artificial wildlife watering stations in the areas designated as wilderness. None of the five alternatives in your draft is satisfactory because all provide for continued hauling of water in heavy-duty trucks operating on so-called administrative roads within the wilderness area. Apparently 26 artificial waters are now being operated in wilderness, and more would be installed under some alternatives. That means many truck trips in wilderness, where there should be no motor vehicles.

The exception in section 4(c) of the Wilderness Act for nonconforming activities when they are the minimum necessary hardly applies here – the minimum necessary surely is to let nature take its course. Desert species such as bighorn sheep and pronghorn antelope evolved in this arid climate. It is time to stop hauling water in wilderness.

Impacts from vehicles driven by the US Border Patrol are another problem. I grew up in San Diego and know very well that securing the border is an endless challenge. In Cabeza Prieta your plan shows more than 30 unauthorized vehicle routes in the wilderness created either by patrol vehicles operating off-road or by people driving across the border illegally. And yet the plan does nothing to stop these impacts. I urge you to collaborate more intensively with the Border Patrol and develop solutions to this problem that should appear in the final plan. More thorough patrol along the border line is one possibility that might reduce entry through the wilderness area. The bottom line is, there should be less driving in the wilderness. Every vehicle trip adds to impacts harming wildlife habitat.

I favor the expansion of the visitor center at the refuge headquarters in Ajo, Arizona, and removal of the communications towers at Childs Mountain by 2018, as provided in the draft plan. Thank you for the opportunity to comment.

Sincerely,

R L Toffoon

P.S. I was born in Chandler AZ in 1945 + have lots of family in the area. Also own property in Belen NM

57

John Slown, Division of Planning NWRS R-2 U.S. Fish & Wildlife Service

Albuquerque, NM 87120 john_slown@fws.gov Fax: (505) 248-6874

Dear Mr. Slown:

Please accept these comments on the *Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan.* I spend some amount of my leisure time in the Cabeza every year and care deeply about the protection and management of the area and its resources.

I am asking that the U.S. Fish & Wildlife Service support the strongest protection of wilderness and wilderness values for the Cabeza, a minimalist approach to water developments in wilderness, and the actions that will best protect Sonoran pronghorns and all other wildlife on the refuge. I encourage the USFWS to select and implement Alternative 2, but to also include elements of Alternatives 3 and 4 as well.

I support Alternative 2 because it affords the greatest protection of wilderness and wilderness characteristics of the Refuge. It means less water hauling (page 243) and less administrative use of travelways in the wilderness. I support the closure of 60 miles of administrative tracks open on the refuge. Roads disturb and fragment habitat and roads do not belong in wilderness. (Alternative 2) I also support the minimization of developed water catchments in the wilderness. Keep it natural, undeveloped and maintain outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Please work to minimize the effects of exotic plant species by limiting soil disturbance, working with Mexico, and working to revegetate with native vegetation areas that have been disturbed. I also encourage the USFWS to protect cultural resource areas from damage due to unauthorized entry. Periodic patrolling by refuge law enforcement officers will help avoid damage and discourage unauthorized entry to these sensitive areas (Alternative 4). Under current actions, sites are only checked for damage if they are near an area that is being monitored for a different project and no record is being kept on what damage, if any, is found. I support periodic patrolling under conditions where USFWS specifies exactly how these patrols will be done. If patrols can be done with minimal effect on wilderness, including by foot or horse in the wilderness, I suggest that the refuge staff take an initial inventory of all known sites so that references can be made on how much damage is occurring in these areas (issue not present in any of the proposed alternatives).

Sincerely,

David R. Barnes

David R. Barnes 7278 W. Maple Ridge Dr. Tucson, AZ 85743

9 September 2005

John Slown
Division of Planning, NWRS R-2
U.S. Fish & Wildlife Service
PO Box # 1306
Albuquerque, NM 87120

Dear Mr. Slown:

Please accept these comments on the *Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan.*

I have made over a half dozen trips across the Cabeza Prieta starting in the mid- seventies. It was an incredible, pristine area. I have not had the courage to go recently to see what it being done to it by illegal off-road driving, activities of migrants and law enforcement agencies, invasive species, and habitat degradation in general.

As President of the Friends of Buenos Aires NWR, I am all too familiar with these problems, although they are much more severe on the Cabeza Prieta. (This is for identification only. This is my personal statement, not one for Friends of BANWR.)

The primary purpose of our 540 National Wildlife Refuges is to preserve habitat to support wildlife. Although each refuge has a particular key species, such as the Sonoran pronghorn in the Cabeza Prieta, maintaining appropriate habitat for *all* species of the ecosystem is essential. That should be the underlying goal of the management plan.

The key to achieving this goal is to designate wilderness status, since it provides maximum protection for wildlife habitat. I applaud the ecosystem approach the USFWS has taken in their draft EIS/CCP as it considers wilderness as ecologically connected to the health of all the native wildlife on the refuge. Essential to this is connecting fragmented habitats with wildlife-travel corridors.

Maintenance of a healthy habitat requires your continued removal of newly found populations of exotic fountain grass by hand and implementation of inspecting vehicles, equipment and clothing for any seeds or plant matter prior to entering the refuge in order to limit the spread of exotic plants. A plant nursery in a non-wilderness for growing native species for revegetation is a good idea as is a draft proposal to work with the Mexican government to try to better control the spread of exotics along Mexican Highway 2, directly adjacent to the refuge.

A strategy for the long-term management of Sonoran pronghorn populations is essential. The captive breeding areas may work for the short-term rapid re-growth of the population, but a long-term management plan, with suitable monitoring for the Sonoran pronghorn population should be implemented.

I am concerned about damage not only to habitat, but also to the cultural resources. Periodic patrols by refuge law enforcement officers will help avoid damage and discourage unauthorized entry to these sensitive areas. USFWS needs to determine the most appropriate way these patrols should be done (foot, horse, ORV, etc.) to ensure that the patrolling does not do more harm than good. Initial

baseline studies should be planned.

I am well-aware of wild driving by Border Patrol agents on the Buenos Aires NWR and I have seen pictures of the destruction done on the Cabeza Prieta (which I know is also done by drug runners and other illegals.) In any event, a training program for border law enforcement personnel on the sensitivity of the areas will also help to avoid damage. Hiking trails should not divert visitors into these sensitive areas and the known areas of cultural occupation should remain unpublished, including in the visitors center.

The policies that I favor are distributed among the various alternatives, so that I cannot completely support one or the other. I do appreciate your efforts to protect this incredible national natural heritage from further degradation.

Sincerely yours,

Roy M. Emrick
2220 N. Norton Ave.
Tucson, AZ 85719-3831

September 10, 2005

John Slown, Biologist/Conservation Planner
US Fish and Wildlife Service
P.O. Box 1306
Albuquerque, NM 87103
john_slown@fws.gov

Dear Mr. Slown:

Please accept the following comments on the draft Comprehensive Conservation Plan for Cabeza Prieta National Wildlife Refuge. I write because this area has national values for wildlife habitat, and I'm concerned that these values are placed at risk by the draft plan. I have visited many national wildlife refuges during my years watching birds and consider them a great national asset. Some of my fondest memories include birding in New Mexico.

FWS may be under pressure to boost the population of Desert Bighorn by continuing to truck in water to artificial watering stations within the wilderness areas of Cabeza Prieta. This pressure should be resisted. The use of heavy trucks on routine trips on "administrative trails" within the wilderness boundaries is surely harming the overall wildlife values of the refuge. It is also a violation of the Wilderness Act. It takes a real stretch of the imagination to claim that the artificial water program is permissible under the "minimum necessary" standard in the Wilderness Act, section 4.

Some national wildlife refuges are appropriately managed with artificial measures such as dikes, canals and vegetative manipulation to favor desired species of water birds. I have visited many of those refuges. Cabeza Prieta is not supposed to be an intensively managed refuge. Please rewrite the draft CCP to bring an end to the water-hauling program. Remember, there were no trucks hauling water when the Desert Bighorns prospered there 200 or 300 years ago.

The Border Patrol also is using motor vehicles in the wilderness areas, possibly exceeding what is allowed by language in the 1990 Arizona Desert Wilderness Act. The draft CCP says this is outside the scope of the plan, but something should be done in the final plan to grapple with this problem. FWS should work to reach agreement with the Border Patrol to reduce the usage of vehicles in pursuing undocumented aliens. It is unreasonable to give up and let the impacts become even worse in the years ahead. A range of other alternatives should be considered that would provide border security with less need for motor vehicles in the wilderness areas.

I favor the removal of communications facilities on Childs Mountain by the year 2018 as shown in the draft CCP, and I favor the expansion of the refuge visitor center at the Ajo headquarters site. Thank you for considering these comments.

Sincerely,
Kurt R. Schwarz
9045 Dunloggin Ct.
Ellicott City, MD 21042
krschwa1@comcast.net

September 10, 2005

Dear Mr. Slown:

Please retain the Cabeza Prieta NWR as an area where I can continue to enjoy the native plants and animals. This past spring was an exceptional time to see wild flowers. I hope that this area can continue to be enjoyed by protecting it from intrusion of non native plants and animals and human development.

Sincerely yours,
Kenneth Gometz

September 11, 2005

Comments on the Cabeza Prieta NWR Draft Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement

Dear Mr Slown

I am interested in the draft plan, but have concerns. I have some acquaintance with the subject being a former member of the Arizona Game & Fish Commission.

I would be willing to support either alternatives 4 or 5. In my mind the pressing need is for the FWS to:

1. **Place wildlife conservation first and above wilderness preservation**
2. **Not to close any administrative trails, and**
3. **I completely reject alternatives 2 and 3**

Bill Berlat
Pinetop, AZ

Jim Malusa
2609 E. Waverly
Tucson, AZ 85716
jimmalusa@hotmail.com

John Slown
Biologist, Division of Planning
NWRS R-2
USFWS
PO Box 1306
Albuquerque, NM 87120
9 September 2005

Dear Mr. Slown –

Following are my comments regarding the Cabeza Prieta NWR Draft Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement.

First, a bit of bragging that's meant to establish my familiarity with the refuge. Since my first camping trip in the Cabeza in 1983, I've spent at least a hundred nights and hiked hundreds of miles in the refuge. Lucky for me, I was paid to do it from 1999 to 2003, when the NPS and the BLM commissioned me, working for the USGS, to make a vegetation map of the refuge for the hopeful benefit of the Sonoran Pronghorn.

So I was around before and during the wave of migrants and smugglers that, along with the pronghorn plunge of 2002, is the most pressing management issue of the refuge. And the saddest. I hope that the refuge can convince the Border Patrol to limit its activities to the border (I support a vehicle barrier), Interstate 8, and Highway 95, and leave the refuge alone. After all, the border crossers aren't planning on staying in the refuge

– they wish to cross it. Vehicle pursuits within the refuge are causing heart-breaking damage.

But that's outside the scope of the plan. I support Alternative 2, Minimum intervention, with elements of Alternatives 3, 4, and 5.

Specifically, I support Alternative 2, but with the allowance of wilderness hunting excepting of course the pronghorn and other threatened/endangered wildlife. By wilderness hunting I mean with a bow, on foot, allowing stock animals if there exists a certified weed-free feed that can be carried along.

Also, campfires of downed/dead wood should be allowed everywhere but Papago and Tule Wells, and Christmas Pass, where you would need off-refuge wood (of any species, unless the refuge would like to supply otherwise. How about a pile of scrap wood at the office where you pick up the permit? Most folk would gladly toss it in their truck). Prohibiting fires is the current rule, and to anyone that has actually backpacked in the Cabeza it is clearly uncalled for, and subsequently ignored. Instead, there should be some mention in the permit of "no fire rings" in backcountry camps, and some pleading to use the minimum fuel required. The refuge staff should monitor the state of the more heavily used backcountry camps, like the one below the Cabeza Prieta tanks, to see if fires need to be restricted. Blanket restrictions like "no fires" confounds the important (protecting the heavily used road-camps) and the trivial (a once a decade campfire on the bajada of the Granites or Growlers).

More on camping: the use of arroyos should be encouraged. An evening of limited wildlife movement along these corridors is better than the long-lasting aesthetic mess that comes from disturbed desert pavements. Arroyos are self-cleaning; a single good storm sweeps everything away.

As for the Copper Canyon Road Loop – why "develop' it? It already exists. Want to develop something? Try making road camps: a signpost and parking spot are all that is needed. In addition to the already established sites at Papago Tank, Tule Tank, and Christmas Pass, sites could be, along the Camino, at Cholla Pass, the wash just east of O'Neil's grave, the lava field, near Tule Tank, and Tornillo Butte. Along the Tacna Road: out in the valley near the Pintas at the arroyo with the unmistakable enormous ironwood, and near the Point of the Pintas. Along Charlie Bell there could be camps in Daniels Arroyo and the arroyo just east of Packrat Hill. Charlie Bell Pass is a rotten camp – caliche lumps and a night wind – but it's a tremendous view, so maybe a spot could be established at the parking area at the pass.

These are all places preferred by frequent visitors, but the newcomers are left on their own to find anyplace but the big three (Papago, Tule, Christmas). Consequently, nightfall often finds them short of their destination, and they tend to drive off road for a ways, searching for a tree. It's the hominid thing to do.

Thanks for the big effort. Good luck.

Sincerely,
Jim Malusa

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September 8, 2005

John Slown
Division of Planning, NWRS R-2
U.S. Fish & Wildlife Service
PO Box # 1306
Albuquerque, NM 87120

Dear Sir:

Please accept these comments as part of the public record for the Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS) and Draft Wilderness Stewardship Plan for the Cabeza Prieta NWR.

The Cabeza Prieta region offers outstanding ecological, geological, cultural, and educational values to all US citizens. With 93% of its lands designated wilderness, the Cabeza Prieta National Wildlife Refuge represents one of the largest wilderness areas in the lower 48 states. The Cabeza encompasses most of the range of the endangered Sonoran pronghorn, and offers crucial habitat for desert bighorn sheep.

But the area and its wildlife are threatened by illegal off-road vehicle activity, invasive/exotic vegetation, habitat degradation, and border traffic funneled into the refuge by increased border enforcement activities at other points of entry along the US-Mexico border.

Specific Actions I believe the USFWS should undertake include:

Sonoran Pronghorn

1. Reevaluate the necessity, development, and use of surface water cachements for Sonoran pronghorn. These cachements are not a desirable wilderness management tool because they mimic water supplies pronghorn would use in captivity, not in natural, wild habitat. Research and document the positive and negative effects of providing unnatural sources of water to pronghorn, as well as how the effects of motorized travel corridors, both inside and outside wilderness, disrupt the natural hydrologic cycles (sheet flow) supplying water to vegetative cover and forage upon which Sonoran pronghorn rely.
2. Restore wildlife movement corridors across highway 85 and remove all fences that could prohibit movement of Sonoran pronghorn. The pronghorn recovery team has made it clear that reestablishing movement between habitats is crucial to the recovery of the Sonoran pronghorn.

Desert Bighorn Sheep

1. Redevelop existing water tanks in wilderness to improve their capacity and collection systems, as well as making the tank levels more apparent from the air. Explore the feasibility of using photovoltaic systems to monitor and remotely transmit water levels.
2. All management activities proposed/performed in wilderness should be evaluated for need and method of completion under a Minimum Requirements Analysis. As with Sonoran pronghorn, the USFWS should fully explore and document the relationship between desert bighorn sheep and the necessity, use, and effect of water tanks on sheep populations.

Invasive/Non-Native Plants

1. The visitor orientation video and permit for the refuge should incorporate aspects of educating the public about the spread of noxious weeds and how to prevent it.
2. Border Patrol vehicles that are used along various locations of the border should be cleaned periodically and after traveling in heavily infested areas before entering the refuge.

Interpreting Cultural Resources

1. Intertwine the management of cultural resources and the implementation of an environmental education program. Stories of the past cultures that inhabited the refuge and surrounding area are an integral part of environmental education and cultural awareness.
2. USFWS should work closely with the Tohono O'odham and other native tribes along the Colorado River to document and share their ancestor's use of the land, myths, and rituals. Understanding cultural resources is integral to the desire to protect them.

Administrative Trails

1. Roads disturb and fragment habitat and they do not belong in wilderness. USFWS must continue to explore ways in which it can complete the necessary management actions without developing new roads.
2. Close unnecessary administrative trails in the wilderness. Retain the language in the preferred alternative under this section that allows permanent closure of all administrative trails if water hauling is deemed no longer necessary.

Leave No Trace

1. Implement a Leave No Trace program not only at the refuge office, but also in the backcountry and along motorized travel corridors to help the public understand the fragility of desert resources.
2. Law enforcement officers should be trained and encouraged to interact with the public and offer information about Leave No Trace and the natural resources of the refuge.

Managing Visitor Access

1. The preferred alternative is not acceptable. Any motorized corridor of 200 feet should only allow visitors to travel on established roadways and to pull off only as far as needed to allow other vehicles to pass. There should not be a blanket 100-foot wide corridor. Group sizes on refuge roads should be limited to 5 vehicles per party and 16 people.
2. The current permit process should be kept in place and not moved to a phone or web based system. Pack stock should continue to be allowed under special use permits.
3. The preferred alternative should clearly prohibit Off Road Vehicles such as four wheelers, motorcycles, and three wheelers from operating in refuge wilderness.

As a future Arizona resident and fellow American, I appreciate the opportunity to comment on this very important plan for the Cabeza Prieta's future.

Sincerely,

Gerry Wolfe
PO Box 356
Death Valley, CA 92328

9-9-05

Mr. John Slown,
Written comment for the record concerning
Cabeza Prieta NWR
Provide surface water catchments, where practicable, for all native wildlife.
Remove all fencing as well as all domestic livestock.
Close and obliterate all roads that are not needed to manage the W.R. Strictly enforce illegal off-road vehicle activity (ATV's, etc.)
Allow the land to return to nature, to the extent possible.
Sincerely, Gary V. Christensen

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17 pages

ARIZONA DESERT BIGHORN SHEEP SOCIETY
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September 12, 2005

Mr. John Slown, Biologist/Conservation Planner Fax 505-248-6874
Cabeza Prieta Planning Team Leader
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, NM 87120

Re: Comments on the Cabeza Prieta NWR Draft Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement (Draft Plan)

Dear Mr. Slown,

On behalf of the Arizona Desert Bighorn Sheep Society (ADBSS), its Board of Directors and our 1100 dedicated volunteer wildlife conservation members the following comments are submitted regarding your list of alternatives and draft Comprehensive Conservation Plan (CCP), Wilderness Stewardship Plan and Environmental Impact Statement (EIS) for the Cabeza Prieta National Wildlife Refuge (CPNWR). We are extremely relieved to see the journey of the past five years approach this critical juncture and appreciate the opportunity to once again offer comment.

Wildlife First

The ADBSS completely supports the premise within the CCP that wildlife conservation comes first on the Cabeza Prieta National Wildlife Refuge (sections 1.1.1 and 1.8.1). Although this has not always been the case with past refuge and U.S. Fish and Wildlife Service administrations we are very relieved to see it a written commitment supporting the fundamental principle of the organic National Wildlife Refuge System Improvement Act of 1997.

Wilderness Stewardship

The ADBSS must take exception to the repeated inferences that the Wilderness Act of 1964 is the governing wilderness law for refuge wilderness and to the implied ambiguity or omission regarding congressional intent in the Arizona Desert Wilderness Act (ADWA), i.e., sections 1.2, 1.5.9, 1.6.2, 1.6.3, 1.7, 1.13.2.7, 2.1, etc. This is the fundamental issue that has plagued the Cabeza Prieta for the past 15 years with errant and embellished wilderness restrictions and as such it merits considerably more discussion and guidance within this plan. This issue is a lot

more than just the use of vehicles on administrative trails to monitor and maintain water developments or the needs for a minimum requirements analysis (MRA). The fundamental issue is about realizing that the United States Fish and Wildlife Service (FWS) has the authority under the ADWA to conduct today, in an unimpeded fashion, the same management activities within the refuge that it did during the de-facto wilderness management years (1974-1989) and prior to the ADWA. The ADBSS has previously provided FWS with copies of the April 3, 2000 legal brief prepared by Mr. William P. Horn, which clearly shows that the intent of the 101st Congress was that the activities employed on the refuge during de-facto wilderness management from 1974 to 1989 were to continue and to be allowed after passage of the ADWA in 1990. From our perspective this legal brief is considerably more credible than the supposed contrary verbal opinion from an unnamed FWS solicitor referenced in section 1.13.2.7. A copy of Mr. Horn's legal brief is included as an attachment to these comments so that it is certain to become part of the official record. To aid you in understanding our position regarding this most important and fundamental issue relative to unwarranted wilderness restrictions the following excerpts from the congressional record are presented as evidence of congressional intent and law during deliberations of the ADWA.

Remarks from Rep. Morris K. Udall (D-AZ) in the *Congressional Record*, p. H1410, April 3, 1990:

"Wilderness designation will not bring any great changes to the administration of these refuges. They were studied and positively recommended for wilderness in the administrations of Presidents Nixon and Ford and have been managed as wilderness since that time. Today we are proposing to formalize the regime that has governed the refuges for at least 15 years."

"Some in Arizona have charged that wilderness designation will change the very purpose for which these refuges were established and managed. But there is absolutely no basis for this. The refuges were created for certain wildlife conservation purposes and so they will remain. Wilderness is simply on overlay."

"The administration has testified that the activities common in the refuge today – for example, donations of time and labor to construct water catchments by organizations such as the Arizona Desert Bighorn Sheep Society – will continue"

Other remarks from distinguished members of the 101st Congress, *(Id.)*, and S. Report 359, 101st Congress, 2nd Sess. At 20 (July 10, 1990)

"A bill such as this one, which essentially adopts prior recommendations for wilderness designations, will result in little if any change in the way in which the areas have been managed since recommendation (1974)."

"A wilderness designation...does provide limited exemptions for livestock grazing, preexisting motorboat, vehicular and aircraft use and some commercial recreation such as guiding and rafting trips."

"Under existing wilderness management policy, a wide range of wildlife management activities are, and will continue to be, allowed in the four Arizona wildlife refuges."

"The Fish and Wildlife Service recently testified in front of my committee in favor of HR 2571 and indicated that the wilderness designations included in the bill will not adversely affect or unduly restrict wildlife management operations on these four desert wildlife refuges."

"Management of Bighorn sheep populations and habitat is one of the primary reasons for establishment of the refuges in 1939. The designation of wilderness is not intended to change this or any other purpose for the refuge."

Report from Mr. Michael J. Speer, Regional Director, Region 2, USFWS, S. Rep. 359, 101st Cong., 2d Sess., at 34-35 (July 10,1990)

"On the Kofa refuge, maintenance of approximately 89 existing wildlife watering facilities and construction of 7 new sites has occurred since the original proposal was submitted to Congress. On the Cabeza Prieta refuge similar habitat management efforts have also been implemented. We have modified methods of personnel and material transport from wheeled vehicles to helicopter transport where appropriate but such modifications have not caused us to delay or forgo in any manner management actions considered necessary to further our mission in the administration, protection and enhancement of the lands and wildlife for which we are responsible."

Collectively the legal brief and the intent of Congress clearly demonstrate that the ADWA should not be an obstacle to wildlife conservation activities on the CPNWR as has been the case in the past. Refuge wilderness is to be administered in accordance with the full intent of the ADWA and not simply tied to the overly restrictive prescriptions contained in the Wilderness Act of 1964. Addressing this repeated oversight and omission throughout the CCP would be most appreciated.

We would also suggest that in some manner this plan provide a programmatic policy that allows the routine vehicular use of administrative trails for the periodic monitoring of habitat and wildlife water developments, that existing wildlife water catchments are to be routinely maintained and redeveloped as necessary to provide reliable sources of wildlife water and that additional wildlife water developments may be constructed as determined necessary to fulfill the FWS wildlife conservation mission.

We would additionally expect the CCP to reaffirm our understanding of current FWS Region 2 direction regarding the prioritization of conflicting mandates in the wake of the Sonoran pronghorn crisis. That prioritization being that the National Wildlife Refuge System Improvement Act is *first*, that the Endangered Species Act is *second* and that the Arizona Desert Wilderness Act is *third*. As we have mentioned in past scoping comments failing to address and properly prioritize these conflicting mandates and purposes (section 1.7) is certain to diminish

the effectiveness of the CCP and will only perpetuate the ongoing controversies which have in the past jeopardized our very valuable wildlife resources. The CCP should provide you with the latitude to be proactive in regards to fulfilling the needs of wildlife rather than simply being reactive after a problem or crisis is presented.

To that end we completely support the ideal that wildlife is a wilderness resource (section 1.12.6) but must express caution with the reference to a "natural population" as the term can be very subjective. If the conservation of wildlife is to be first as supported previously then one would expect the wildlife wilderness resource to be better defined as a robust, self-sustaining and viable population. In the world of today very little can be viewed as being "natural". The Cabeza Prieta is no different.

Interagency Cooperation

Although we disagree with the assertion made in section 1.14.1.1 relative to the authority for management of non-migratory wildlife the ADBSS is please to see the recognition given to the Arizona Game and Fish Department (AGFD) as a full partner in wildlife management activities on the CPNWR. The wildlife biologists employed by AGFD have the same educational backgrounds as FWS employees. Their experience with aerial and ground wildlife surveys; hunt management; capture, marking and transplant operations; wildlife research; and, wildlife resource planning strategies is at least equivalent to, if not surpassing, that of the FWS.

The ADBSS encourages the CPNWR staff to continue to seek input and recommendations on the refuge's wildlife management programs from the AGFD and to treat them as a mandatory cooperator.

Elements Common to All Alternatives

The ADBSS would encourage the CCP to more responsively address the habitat and wildlife water monitoring needs in section 2.1.1.1.2. A more consistent and responsible long term monitoring program would prescribe regular and routine on the ground observations throughout the year, which in our informed opinion, is allowable under the ADWA. The current reliance upon Sonoran pronghorn aerial reconnaissance to also investigate remote wildlife waters should not be considered a permanent solution unless you are forecasting the continued listing of this species as endangered and a continuing funding source.

We are vehemently opposed to the notion that a Minimum Requirement Analysis (MRA) be performed for the use of administrative trails, especially in regards to water hauling, habitat and water monitoring (section 2.1.3.1), and trespass livestock removals (section 1.13.2.3). These activities were conducted without a MRA during de-facto wilderness management (1974-1989) and as such these activities and the continued routine use of administrative trails is allowed under the ADWA. The FWS may elect to perform a programmatic MRA with this CCP to permit the use of these trails for monitoring and water hauling but such action is not mandated by applicable wilderness law. Past experience on the Cabeza Prieta has shown that an MRA can be a

considerable obstacle to a variety of wildlife conservation activities and as such this negative potential needs to be neutralized with this CCP.

A sunset clause should be prescribed with regards to the area closures in section 2.1.1.1.4. It is widely recognized that these closures for the supposed benefit of Pronghorn fawning provide little more than an assumed public relations benefit. No scientific data currently supports the closures and its effects are widely compromised by the flood of illegal immigrants traversing the closure areas throughout the year.

We appreciate the summary table in section 2.1.2 showing the steady decline in the estimated population of desert bighorn sheep from 1993 to 2002 but consider the decline very unfortunate. It should be noted that this precipitous 33% drop in one of refuge's flagship wildlife species is higher than that experienced during the same time frame in other adjacent areas including the nearby KOFA refuge and is concurrent with the incremental embellished wilderness restrictions experienced on the Cabeza Prieta over the past decade and half.

It might be important to note that the University of Arizona research project investigating desert bighorn sheep water preferences and identified in section 2.1.5.1.2 is currently in its terminal year and that the loss of 15 animals associated with the study has so far been documented over the past four years.

No Action Alternative

We must once again take exception to the context of the no action alternative as it implies that somehow a new and revised status quo has been established over time and without the benefit of public review and the completion of any management planning process. Since the FWS abandoned the previous 1998 CCP effort (the "white book") the only refuge management policy with current standing would be the 1987 "Service Policy" and the de-facto wilderness management program (1974-1989). Consequently your no action alternative should include all of the activities and policies that existed in the 1980's including but not limited to the unencumbered maintenance and construction of water developments, access to administrative trails, no camping restrictions and an emphasis on bighorn sheep management and population enhancement. As with past draft CCP efforts we must again differ on the substance and content of a "no action" alternative and its errant reference in all of the current alternatives.

We respectfully request that under this alternative the CCP provide and accurate table identifying and listing the 145 miles of designated administrative trails cited in section 2.2.2.4. This table should identify and describe the start and end points of the trail as well its measured mileage. This table is needed to ascertain the previously noted discrepancy between the current draft CCP inventory (145 miles) and the previous 1998 draft CCP inventory (159 miles). Because the Cabeza Prieta is such an expansive area each and every mile of designated trail provides priceless administrative access, the apparent loss of 14 miles, or nearly 10% of the total mileage, warrants careful examination and an accurately documented inventory. This accurate inventory

is needed before any further consideration be given to closing and rehabilitating the 139 miles of identified trackways not considered as being part of the administrative trail system.

We also must note that the only official wilderness boundary description and map known to exist for the Cabeza Prieta wilderness describes a 600' wide corridor along the three major refuge roadways and is in conflict with the 200' wide corridors stated in section 2.2.3.1. It is also interesting to note that this same boundary description reveals a 60' wide reservation along the international boundary with Mexico. It is recommended that the CCP provide conclusive evidence and documentation of the legal boundaries for the Cabeza Prieta wilderness to avoid a potentially embarrassing situation in the future.

Alternative 2 – Minimum Intervention

The ADBSS rejects this alternative as it conflicts with the basic purpose for which the refuge was established (conservation of wildlife resources) and contradicts the mandate prescribed in the organic National Wildlife Refuge System Improvement Act of 1997 (wildlife conservation is first). This alternative would be inappropriate and illegal as it places wilderness preservation over and above wildlife conservation.

It is absurd to prescribe under this alternative the removal of nearly all of the wildlife water developments on the refuge except those required for the endangered Sonoran pronghorn. This would suggest that only imperiled wildlife species are deserving of management attention and would be akin to adopting the administration philosophy of a National Park.

We must take exception to the implications in section 2.3.1.2.3 and the concerns that supplying water for desert bighorn sheep is artificially supporting unnaturally high population numbers. We must assert that in order to ensure desert bighorn sheep for the enjoyment of future generations proactive management activities such as supplying water are necessary to mitigate the effects of our changing world and ever diminishing and impacted wildlife habitat. The Sonoran pronghorn situation is a classic case study of the result of pure preservation and its effect on a very susceptible desert wildlife species. Desert bighorn sheep are no different.

Alternative 3 – Restrained Intervention

The ADBSS does not support this alternative as it falls short of achieving the wildlife conservation potential of the refuge. The refuge and its wildlife resources have suffered enough with the restrained management regime of the past 15 years.

We might point out that the population goals prescribed in section 2.4.1.2.3 represents the current depressed status of desert bighorn sheep numbers on the refuge. We also noted an apparent oversight in the stated sheep densities and available habitat. We are sure you intended to reflect these values in square miles and not acres.

We do appreciate the proposed effort in section 2.4.2.1 to streamline the MRA process and to establish programmatic MRAs for all predictable and reoccurring activities. We would assume that this would apply to desert bighorn sheep habitat and water development monitoring as well as water hauling. We did not see this described as clearly in section 2.1.3.1 and would suggest that the elements common to all alternatives be more accurately described. We would also expect to see the programmatic evaluation included as an appendix.

We oppose the closure of the three identified administrative trails. Management and monitoring of this 860,000 acre refuge is already difficult enough with only the handful of roads and routes that exist. There is little justification for closing these trails other than the appeasement of the preservation community. We are especially opposed to the proposed closures of the Mohawk Trail north of the Eagle Tank Trail and the Monreal Well Trail. Both are very useful and efficient routes for the administration of the refuge (the north Mohawk Trail is especially important). If you must close a token trail we might suggest the section of the Mohawk Trail between the Camino Del Diablo and the tip of the Bryan Mountains. This is a very inconvenient route for anybody other that illegal immigrants.

Alternative 4 – Proposed Alternative for Active Management

This alternative is close to but still falls short of placing wildlife first and responsibly managing the refuge for the benefit of its wildlife species.

We support section 2.5.1.2.1 prescribing the upgrade of existing waters in wilderness and the proposed concept of constructing new waters that would benefit the refuge sheep population. We are confident that an unbiased review of the current body of scientific literature pertaining to wildlife water and bighorn sheep will shown that the clear majority of this research has found water to be either a benefit or neutral. There is little evidence to indicate that wildlife water is a negative, despite repeated, unfounded and unsupported allegations to the contrary.

We would express caution to the implied future dependence on remote monitoring of wildlife waters. Although taking advantage of this new technology has merit and may reduce intrusions into wilderness it is not foolproof and it should not completely replace the need for periodic on-the-ground monitoring and evaluation. Natural resource management is as much art as it is science and the ability to visit the resource and gain a sense of its condition should not be understated. The Arizona Game and Fish Department currently operates a program in which all wildlife waters are visited at least twice per year. This same regime should be available on the Cabeza Prieta for all of its waters, not just those for Sonoran pronghorn.

The desert bighorn sheep population goal of 500-700 animals would appear to be low in that it is based on a lower than average sheep density when compared to other nearby ranges. A more appropriate goal would be a population range that meets or exceeds the average sheep density.

We are supportive of predator management (section 2.5.1.2.4) especially in regards to mitigating losses to bighorn sheep. We would therefore like to see a more active program proposed rather

than just a lion movement study. Ecological and wildlife peer reviewed journals contain the results of numerous mountain lion studies. This being the case we see no need to suspend predator management on the CPNWR until new research is conducted. Lions will be present wherever an adequate prey base exists but desert bighorn sheep are not the primary prey base. The reproduction cycles of the two are not complimentary. As a consequence large predators such as lions and coyotes need to be controlled to prevent wide swings in bighorn sheep numbers. We would expect the CCP to acknowledge the dynamics of this widely accepted predator-prey relationship especially in regards to the relatively small prey populations that exist in the Sonoran Desert.

We would warmly support the expansion of hunting opportunities (section 2.5.3.2) to also include mule deer, small game and predators as it would be consistent with one of the priority refuge recreational uses (hunting) prescribed in the Refuge Improvement Act.

Alternative 5 – Maximum Effort

The ADBSS is very supportive of this alternative as it would maximize the resource potential of the refuge and would more responsibly pursue the objectives for which the refuge was established and the overall mission of the FWS.

We very much appreciate the desert bighorn sheep population objective of 900-1200 animals if that number is realistic and achievable. We would hope that the final preferred alternative would approach this population range as a goal and we would support the active management prescriptions necessary to achieve this goal. We would not expect forage enhancements and translocations as being a desired component of achieving that goal although they may be determined necessary at some point in the future to avert any unforeseeable calamities. In our opinion the optimum desert bighorn population would maximize the available habitat and forage on the refuge and would not be dependant on the availability of free standing water. This optimum population could then be used to repopulate other areas of the state where desert bighorn sheep have either been extirpated or are currently struggling. There should be no reason that the Cabeza Prieta could not assist in fulfilling this expanded wildlife conservation role.

Although many of the other elements of this alternative have been addressed above some require additional attention in the context of crafting a more ideal preferred alternative closer to alternative 5. In summary those elements would be:

At a minimum the population goal for desert bighorn sheep should be 900 animals. The routine use of administrative trails for habitat/water monitoring and water hauling should be treated as a programmatic activity and not subject to case specific MRAs. Monitoring should be conducted twice per year at all sites with one being in the months of May-June to ascertain water availability throughout the summer. No administrative trails should be closed, especially the North Mohawk Trail. All existing wildlife waters should be redeveloped to increase their reliability. Additional water developments should be constructed where water availability is currently limited, especially in the Granite, Growler and Aqua Dulce Mountains. Population

surveys for bighorn sheep should be conducted and fully funded every three years. Predator management should be an active component of refuge management. The refuge should begin administrating a broader hunting program similar to the KOFA NWR.

We are confident that if the FWS places wildlife first then the final preferred alternative will contain many, if not all, of these elements.

The Arizona Desert Bighorn Sheep Society remains committed to the proactive management of bighorn sheep in Arizona and the Cabeza Prieta refuge is a significant element towards the fulfillment of that mission.

Thank you again for the opportunity to provide comment on this most important undertaking. Please feel free to contact me should you require any further discussion of these comments.

Sincerely,

D. Pence

Dave Pence
President

Attachment enclosed

xc Duane Shroufe, Director AGFD
Bob Broscheid, Habitat Branch Chief, AGFD
Larry Voyles, Region 4 Supervisor, AGFD
Roger DiRosa, Refuge Manager, CPNWR
William P. Horn, USSA

THE WILDLIFE CONSERVATION FUND OF AMERICA
To protect the Heritage of the American Sportsmen to hunt, to fish and to trap.

April 3, 2000

Honorable Jamie Clarke
Director
U.S. Fish and Wildlife Service
1849 C Street, NW
Washington, D.C. 20240

Dear Jamie:

The Wildlife Conservation Fund of America (WCFA), its Sportsmen's Legal Defense Fund, the Arizona Desert Bighorn Sheep Society, and WCFA members and affiliates in Arizona and elsewhere are deeply concerned about unwarranted and illegal restrictions on wildlife management activities within the Cabeza Prieta and Kofa National Wildlife Refuges. It appears that some persons within the Service mistakenly believe that Wilderness designations within these refuges have the effect of (1) trumping the basic wildlife conservation purposes of these two units and (2) prohibiting accepted, and Congressionally approved, conservation activities and projects, including the development of water catchments for desert bighorn sheep. We urge you to reject this position and immediately reestablish longstanding management practices (i.e., reinstate the legal status quo), which are and always have been consistent with applicable law. These Congressionally approved practices (and other aspects of refuge management) can then be reexamined in the pending comprehensive conservation plan (CCP).

The fundamental purposes of the Cabeza Prieta and Kofa units are wildlife conservation, as reflected in the original 1939 Executive Orders creating the two Refuges and emphasized anew in the National Wildlife Refuge System Improvement Act of 1997 (NWRSIA) (P.L. 105-57). Congress enacted this latter statute, creating for the first time a comprehensive organic act for the refuge system, subsequent to both the 1964 Wilderness Act (P.L. 88-577) and the 1990 Arizona Desert Wilderness Act (ADWA) (P.L. 101-628) (which created the wilderness designations in the two refuges). Wilderness designations within refuges are an overlay and provide only supplemental purposes to guide management. *See* 16 U.S.C. § 1133(a).

Cabeza Prieta and Kofa were both subject to wilderness management restrictions commencing in the early 1970's. During this period, which lasted until formal wilderness occurred in 1990 with passage of the ADWA, the Service authorized the construction, operation, and maintenance of water catchment projects and other wildlife conservation and enhancement activities within these de facto wilderness areas. Congress expressly approved and ratified this kind of wilderness management for

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these two units when it enacted the ADWA. A policy change to the contrary would violate the ADWA and NWRSIA.

Objective review of applicable law demonstrates that the Service has more than sufficient authority to fulfill clear Congressional intent and manage the wilderness portions of these two Refuges primarily for wildlife conservation purposes. The Service may authorize and approve the construction, operation, and maintenance of water catchments and other wildlife enhancements, and approve the related use of motorized vehicles and equipment within wilderness areas. All available evidence demonstrates that these enhancements are beneficial to wildlife and have no adverse effects on wilderness values. Failure to approve such activities, with subsequent adverse impacts on unit wildlife populations, would likely violate of the purposes of Cabeza Prieta and Kofa and of the refuge system mission.

Refuges Established for Wildlife Conservation

The 1939 Executive Orders establishing Cabeza Prieta and Kofa each specify that the units are "reserved and set apart for conservation and development of natural wildlife resources," and further specify that "improvement of . . . natural forage resources" is another purpose for the units. Executive Orders 8038, 8039, Jan. 25, 1939 (emphasis added), Attachment 1. From the beginning, these units have existed for the conservation, development, and improvement of wildlife and related habitat.

Consistent with these express purposes, the Service acted to establish wildlife related developments and improvements, such as water catchments, throughout both Refuges. Through 1994, approximately three dozen of these improvements were constructed in wilderness managed sections in Cabeza Prieta and in Kofa. These improvements involved access on established (and in most cases still existing) roads by motorized vehicle and use of motorized equipment, including cement mixers, pumps, generators, and power tools. Importantly, most of these developments or improvements were installed during the period of de facto wilderness status from 1974 to 1989. These management activities produced beneficial conservation results as populations of desert bighorn sheep within Cabeza Prieta rose to a peak of 478 estimated animals in the early 1990's.

In 1997, enactment of NWRSIA enhanced and emphasized anew the wildlife conservation purposes of the two Refuges. The Act defined the terms "purposes of the refuge" and "purposes of each refuge" to be the "purposes specified in or derived from the . . . executive order . . . establishing, authorizing, or expanding a refuge." 16 U.S.C. § 668ee(10). It also defined the term "conservation" to include "habitat management." *Id.* § 668ee(4). This important statute reaffirmed that conservation, development and improvement of wildlife and habitat are the basic purposes of Cabeza Prieta and Kofa.

The 1997 Organic Act also set forth for the first time an overarching mission for the refuge system, including these two units:

> The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. [16 U.S.C. § 668dd(a)(2).][1]

In fulfilling this mission, and the specific purposes of each unit (e.g., Cabeza Prieta and Kofa), the Secretary and the Service are mandated to "provide for conservation of . . . wildlife" and "ensure" (1) biological integrity, (2) fulfillment of the mission, (3) that "the purposes of each refuge are carried out" with priority assigned to specific unit purposes in cases of conflicts with other goals, and (4) cooperation and collaboration with state fish and wildlife agencies. 16 U.S.C. § 668dd(a)(4) (emphasis added). The federal courts have determined that these mandates require the Service to "actively manage refuge lands and fauna and flora contained therein." *Wyoming v. United States*, 61 F. Supp.2d, 1209, 1220 n.9 (D. Wyo. 1999).

NWRSIA's mandate is clear: Congress has expressly directed The Service to ensure (i.e, guarantee) that the specified purposes of Cabeza Prieta and Kofa (i.e, conservation, development, and improvement) are implemented. Any goals or limitations arising from the 1964 Wilderness Act are supplemental and not intended to trump or thwart achievement of wildlife conservation purposes.

The Arizona Desert Wilderness Act Ratifies Wildlife Management Practices

Wilderness management of Cabeza Prieta and Kofa commenced in the early 1970's following legislative recommendations from the President for wilderness designations within the two units.[2] It has been long established practice that areas specifically proposed for wilderness status or being studied for such status are to be managed as wilderness pending Congressional action on the areas.[3] De facto wilderness status and management came to these units in 1973 and 1974 and continued until the 1990 ADWA formalized this wilderness overlay designation.

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[1] The Service's "Director's Priorities, FY 1999-2000" cites this passage as the "Vision" for the National Wildlife Refuge System.

[2] *See* Statement of Michael J. Spear, Regional Director, Region 2, U.S.F.W.S., ("Spear Statement") reprinted in S. Rep. 359, 101st Cong., 2d Sess., at 34-35 (July 10, 1990) (noting that Cabeza Prieta and Kofa had been managed as "de facto" wilderness since 1974), Attachment 2.

[3] *See Parker v. United States*, 448 F.2d 793, 797 (10th Cir. 1971) (agency did not have discretion to destroy the wilderness values of an area considered for formal wilderness designation); Director's Priorities, FY 1999-2000, National Wildlife Refuge System, Goal 1 ("Director will issue a memo that states . . . that proposed wilderness areas should be managed as if they were designated wilderness."); *see also* Remarks of Chairman Udall, discussed later in this section.

During the decade and a half of the de facto wilderness designation, the Service determined that the development, operation, and maintenance of wildlife related improvements, including water catchments, were fully consistent with wilderness management. As a result, numerous catchments were developed during this period within wilderness portions of Cabeza Prieta and Kofa. The Arizona Desert Bighorn Sheep Society developed a number of these improvements with the approval and cooperation of the Service.

When Congress was considering the ADWA, senior Service representatives testified that within Kofa, for example, approximately 80 wildlife watering facilities had been maintained under wilderness management rules and that seven new catchments had been constructed and that similar activities had occurred on Cabeza Prieta. The Service testified that the formal designation of wilderness (i.e., extension by Congress of the de facto wilderness management restrictions) would not preclude these activities. Spear Statement, S. Rep. 359, 101st Cong., 2d Sess. at 35 (July 10, 1990), Attachment 2. Thus, Congress was aware of this issue.

The enactment of the ADWA constituted express Congressional approval and ratification of the Service's wilderness management regime that allowed the construction, operation, and maintenance of water catchments. When Congress expresses approval or ratification of an agency's interpretation or policy, that interpretation or policy becomes the will of Congress and has the force and effect of law. *E.g., Isaacs v. Bowen*, 865 F.2d 468, 473 (2nd Cir. 1989); *see also Phillips Petroleum Co. v. USEPA*, 803 F.2d 545, 547 n.3 (10th Cir. 1986) (in enacting statute, "Congress intended to ratify EPS's policy of deep well injection."). This doctrine applies particularly when Congress "indicates not only an awareness of the administrative view, but also takes an affirmative step to ratify it." *Isaacs*, 865 F.2d at 473. As discussed below, when officially designating wilderness in these two Refuges in 1990, Congress was acutely aware of (1) the Service's use of water catchment devices and mechanical equipment to create and operate these devices over the preceding 15 years, (2) the Service's management of these areas as de facto wilderness over those 15 years, and (3) the Wilderness Act's general prohibitions on the use of motorized and mechanical devices. At the same time, Congress affirmatively ratified these uses within the new wilderness areas of the Refuges.

The legislative history of the ADWA is absolutely clear that Congress expected and intended that formal wilderness status would bring no management changes in Cabeza Prieta or Kofa regarding wildlife management projects and activities:

> Wilderness designation will not bring any great changes to the administration of these refuges. They were studied and positively recommended for wilderness in the administrations of Presidents Nixon and Ford and have been managed as wilderness since that time. Today we are proposing to formalize the regime that has governed the refuges for at least 15 years. [Remarks of Rep. Morris K. Udall (D-AZ), Chairman, House Committee on Interior and Insular Affairs,

> during consideration of ADWA (H.R. 2571), *Congressional Record*, p. H1410, April 3, 1990, Attachment 3.]

Chairman Udall also spoke directly to the issue of continued wildlife management activities in the formalized refuge wilderness areas:

> The administration has testified that the activities common in the refuge today - for example, donations of time and labor to construct water catchments by organizations such as the Arizona Desert Bighorn Sheep Society - will continue. [*Id.*]

Chairman Udall was not alone in expressing this clear intent to approve and ratify wilderness management practices that provided for water catchment construction. Rep. Robert Davis (R-MI), Ranking Member of the House Merchant Marine and Fisheries Committee (with jurisdiction over Service matters) also stated "[u]nder existing wilderness management policy, a wide range of wildlife management activities are, and will continue to be, allowed in the four Arizona wildlife refuges." *Id.* at H1412. Merchant Marine Committee Chairman Rep. Walter Jones (D-NC) expressed the same intent:

> the wilderness designations in this bill [ADWA] will not adversely affect or unduly restrict wildlife management operations on these four desert wildlife refuges. [*Id.* at H1413.]

The U.S. Senate was similarly aware of this management history and expected that enactment of ADWA would bring no changes to traditional management practices at Cabeza Prieta and Kofa, especially as related to bighorn sheep:

> In fact, management of bighorn sheep populations and habitat is one of the primary reasons for establishment of the refuge [Kofa] in 1939. The designation of wilderness is not intended to change this or any other purpose for the refuge. [S. Rep. 359, 101st Cong., 2d Sess. at 20 (July 10, 1990), Attachment 2.]

The same report also acknowledged conservation of desert bighorn sheep as a primary purpose for Kofa and Cabeza Prieta. *Id.* at 21; cf. *Schwenke v. Secretary of the Interior*, 720 F.2d 571, 577 (9th Cir 1983) (Congress wanted to transfer administration of wildlife Range to Fish and Wildlife Service because the agency's particular mission was to protect wildlife).

Congress intended that the wilderness management practices that existed during the period leading up to enactment of ADWA would be continued following formal designation of wilderness.

These practices included construction, operation and maintenance of water catchments and other wildlife management activity and improvements. This action demonstrates conclusively that Congress not only wanted these activities to continue but was persuaded that nothing in the 1964 Wilderness Act or ADWA would adversely impact or thwart these beneficial conservation projects and activities.

1964 Wilderness Act Does Not Prohibit Construction and Maintenance of Catchments Using Motorized or Mechanical Means

The Service has had long standing policy that permits the use of motorized vehicles and equipment for wildlife management practices notwithstanding section 4(c) of the Wilderness Act, which prohibits some uses of motorized equipment in wilderness areas. Under long established, and Congressionally accepted, policy and practice, motorized equipment may be used within wilderness areas if such equipment constitutes the "minimum tool" to achieve the management objective or purpose. U.S. Fish and Wildlife Service, Refuge Manual, May 8, 1986 (6 RM 8.8.A). The minimum tool is that "combination of methods and equipment that least degrades the wilderness values of the land while meeting refuge objectives in a safe and economical manner," 6 RM 8.2.

The Service has also long recognized that the 1964 Wilderness Act, and section 4(c), is not rigid but confers a measure of "management latitude" on the administering agency (6 RM 8.7) and allows "wildlife management facilities" within wilderness areas if the facilities are "essential to accomplishing refuge management objectives." 6 RM 8.8.I. In this case, protection of desert bighorn sheep populations, as well as wildlife conservation and conservation related development and improvement, are the refuge management objectives arising from the 1939 executive orders and statutorily ratified by Congress via NWRSIA in 1997.[4] Importantly, the Refuge Manual cites the following example of a special situation where motorized equipment use may be approved within wilderness:

> (2) Activities essential to accomplishing refuge objectives. For example, if bighorn sheep tanks [catchments] dry up and the only means of supplying water is by trucking it into the tanks . . . [6 RM 8.8.A(2).]

These policies were in force and effect when Congress enacted the ADWA and were a basis of the representations by Service officials that wilderness designations within the two Refuges would not adversely impact or restrict the development of catchments and the improvement of wildlife

[4] As the later enacted statute, the 1997 NWRSIA takes precedence over the 1964 Wilderness Act to the extent the two conflict. *See Voyageurs Region Nat'l Park Assoc. v. Lujan*, 966 F.2d 424, 428 (8th Cir. 1992) ("Congress was certainly aware of the Wilderness Act when it enacted the Voyageurs National Park Act, and the general language of the Wilderness Act must give way to the more specific provisions of the park's enabling legislation."); *In Re Glacier Bay*, 944 F.2d 577, 583 (9th Cir. 1991) (later enacted TAPS Act preempted earlier enacted Act).

habitat. Congress was fully cognizant of these policies and representations. They became the basis of express Congressional intent that the ADWA would not cause on-the-ground changes in the administration of the two units and the ability to engage in wildlife related development and improvement activities. That express intent, and passage of the ADWA, constitutes Congressional approval and ratification of these traditional policies and practices within Cabeza Prieta and Kofa.

Particularly in light of these Congressional actions, section 4(c) is not a significant barrier to use of motorized equipment. In enacting Chapter 23 (relating to the National Wilderness Preservation System) of the 1964 Wilderness Act, Congress expressly stated that "[t]he purposes of this chapter are hereby declared to be within and supplemental to the purposes for which national forests and units of the national park and national wildlife refuge system are established and administered . . .." 16 U.S.C. § 1133(a). Section 4(c) allows, "as necessary to meet minimum requirements for the administration of the area for the purpose of this chapter," the use of motor vehicles, motorized equipment, other forms of mechanical transport, and structures and installations. *Id.* § 1133(c). As the purposes of the National Wilderness Preservation System are supplemental to the primary purposes for which the refuge units were created and administered, section 4(c) does not prohibit such uses in furtherance of the wildlife management activities of the Service in the two Refuges.

The Service must harmonize section 4(c) with the Refuges' purposes, the general mission of the refuge system, and the specific dictates of the NWRSIA. It is wrong to conclude that section 4(c) simply trumps and nullifies these other statutes.

As discussed above, the legislative history is clear: these water catchment and related activities would continue regardless of formal wilderness designation. To the extent these activities create tension with section 4(c), it must yield. Put another way, the correct interpretation is that section 4(c) does not prohibit these activities. *See National Railroad Passenger Corp. v. National Association of RR Passengers*, 414 U.S. 453, 458 (1974) (even the plain meaning "must yield to clear contrary evidence of legislative intent").

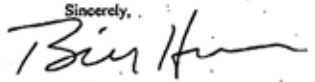
Improper Homage to Supplemental Wilderness Objectives is Harming Wildlife

As previously noted, the wildlife management activities, including development of water catchments, in Cabeza Prieta produced beneficial conditions for bighorn sheep, causing the population to peak in the early 1990's. Unfortunately, this peak coincided with the beginning of the Service's overly restrictive interpretation of wilderness management authority. The subsequent restrictions on operations and maintenance of the catchments took its toll on the desert bighorn sheep and the endangered Sonoran pronghorn. From the 1993 peak population of 478 estimated animals, numbers declined 15 percent by 1996 to 408 estimated sheep and dropped another 11 percent by 1999 to less than 365 estimated bighorns. A 25 percent decline in Cabeza Prieta's signature species is the consequence of the Service's misreading of the law and unwarranted restrictions on conservation management activities, and is a clear violation of NWRSIA and other applicable law.

Conclusion

The legal authorities and the intent of Congress allow, if not compel, the Service to continue creation and operation of wildlife management improvements, including water catchment devices in Cabeza Prieta and Kofa. In light of the past positive effects on the wildlife resources of the two Refuges, the Service should immediately reestablish Congressionally approved management practices regarding wildlife conservation developments and improvements. The management scheme that worked in the 1970's and 1980's should be in force and effect. Moreover, these established and ratified practices may be reinstated without awaiting completion of the CCP's for the units. We stand ready to work with the Service to continue these important wildlife management activities.

Sincerely,



William P. Horn
Counsel to
Wildlife Conservation Fund of America

Attachments

cc: (with Attachments)
The Honorable Jon Kyl
The Honorable John McCain
The Honorable J.D. Hayworth
The Honorable Jim Kolbe
The Honorable Ed Pastor
The Honorable Bob Stump
Brian Dolan
John Fugate
Paul Karres
John Kennedy
Harry Burroughs

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September 12, 2005

Dear Mr. Slown,

Here are my comments on the Comprehensive Conservation Plan.

I am in favor of most of the draft plan except for two things. These are:

(1)- I want the 200 foot motorized corridors retained along with the blanket 100 feet to pull off of the road for camping.

(2)- Any street legal, registered, vehicle should be allowed on motorized corridor roads whether they are four wheel, three wheel, or two wheel. I don't see how it makes any difference how many wheels a registered vehicle has if it is operated on a designated, established, roadway.

I could never understand the logic behind not allowing a motorcycle to drive the El Camino del Diablo. The experience of driving and camping along the El Camino is marvelous and should be available to all people no matter how many wheels are under them. The historical aspect of that road makes it a very special place to visit.

Sincerely,

Frank Colver
320 Morning Star Ln.
Newport Beach, CA 92660

September 13, 2005

Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

Residing in Wisconsin as I do, I was shocked to learn that the Cabeza Prieta National Wildlife Refuge has been subjected to damage from your own and the Border Patrol's vehicles. While I appreciate the important concerns of maintaining border security, our wildlife refuges shouldn't have to pay the price.

You have acknowledged the damage done to the refuge by motorized use, yet you do not offer one alternative in your draft comprehensive plan that protect the outstanding wilderness values in the refuge, which seems to me to be a total disregard for the Wilderness Act of 1964.

You cite hauling water to manage conservation of Desert bighorn sheep as the reason for most of the FWS's continued motorized use in designated wilderness at the same time you acknowledge that you have the service has no science to support the notion that artificial water developments are necessary for the sheep. It seems to me they are called Desert bighorn sheep for a reason -- they have evolved and learned to survive without water trucks in a harsh desert environment.

The FWS has done virtually nothing to analyze or understand the impacts of this activity or to develop a science-based plan for managing the sheep. Continued water hauling is inexcusable and the final CCP should halt it.

Surpassing the water hauling, border law enforcement is wreaking havoc on the refuge. Of course the Border Patrol faces serious challenges, but wilderness preservation has to be as high priority. It is inappropriate, and probably illegal, to open vast sections of the refuge's wilderness to unlimited vehicular use and road building. The draft CCP acknowledges the damage from this use in the refuge, but goes on to say that the issue of border law enforcement is "outside the scope of the CCP." If the most damaging activity in the refuge falls outside a Comprehensive Conservation Plan's scope, what could possibly fall within it?

Those of concerned with wilderness conservation and preservation look to your agency to manage this and all refuges and their resources for all Americans. We deserve more than silence from your agency on this critical issue. Please adopt a management plan that protects the refuge wilderness by working with the Border Patrol to bolster law enforcement at the border itself and by eliminating all vehicular use in designated wilderness areas.

Thank you for considering my comments.

Sincerely,

Nancy Davlantes
5983 Sugarbush Lane
Greendale, Wisconsin 53129-2624

69

John Slown
Biologist/Conservation Planner
US Fish & Wildlife Service
NWRS, Southwest Region, Planning Division
P.O. Box 1306
Albuquerque, NM 87103
Fax: (505) 248-6874

13 September 2005

Dear Mr. Slown:

The Wilderness Act of 1964 must be followed. The expanding vehicular use in the refuge's designated wilderness is appalling, illegal, and shows disregard for the laws of our nation, particularly given the damage that your agency finds pursuant to this illegal use.

This is a nation of laws.

All of the alternatives in the draft comprehensive Conservation Plan (CCP) for the Cabeza Prieta National Wildlife Refuge fail to protect the wilderness from motorized use.

Why, contrary to wildlife management science, do you continue to truck in water for the Desert bighorn?

How are you going to manage for Border enforcement to fall within the Comprehensive Conservation Plan's scope?

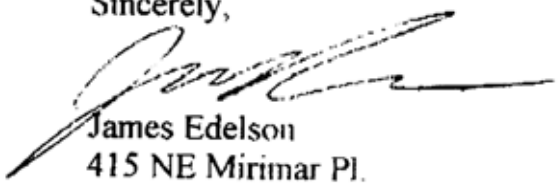
The FWS should manage this spectacular refuge and its resources for all Americans.

Please adopt a management plan that protects the refuge wilderness by working with the Border Patrol to bolster law enforcement at the border itself and by eliminating ALL vehicular use in designated wilderness

areas.

Thank you for your consideration.

Sincerely,



James Edelson
415 NE Mirimar Pl.
Portland, OR 97232 USA
Phone/Fax (503) 231-4665
jedelson@comcast.net

September 13, 2005

I wish to have my comments listed below to be part of the public comments which are to be submitted to you on behalf of the Cabeza Prieta National Wildlife Refuge (CPNWR). I believe that continued effort that will ensure protection of the plant and animal communities and individual species unique to CPNWR is now, more than ever necessary. Among the animal in special need for protection are the Sonoran Pronghorn Antelope and Desert Bighorn Sheep. Among the many concerns would be the redesign of the existing water tanks and catchments which would aid in ensuring that their redesign would augment the antelope's and sheep's need for water. I understand that there are specific measures such as: further study of how the Sonoran Antelope can continue to adapt and thrive in view of the human presence within the refuge. As well as with the Desert Bighorn, Please determine fully, while using the best science available, what the continued use of water tanks would be upon the native bighorn populations. I am confident that the USFWS will use the Minimum Requirements Analysis for determining what all management activities, proposed and performed within the wilderness within CPNWR, to be.

Any visitor to CPNWR should be educated as to their role played in the introduction of invasive/non-native plants. An orientation for all visitors presenting at refuge offices prior to entering the refuge for permits, or for those browsing an exhibit at the refuge visitor center, could further the refuge's goal in protecting the animal and plant communities within. The U.S. Border Patrol, as well, must assume responsibility for their role in the spread of non-native plants, through the transport of plant seed on their vehicles, and for the disturbance of the soil substrate of the Lower Sonoran Desert by the impact of their activities and equipment.

Awareness of the contribution of native cultures to the landscape should be recognized. The USFWS should, with respect to CPNWR, take into it's view the management and protection of it's cultural resources. and establish an environmental education program which would give respect to the native culture. This could be accomplished by the dissemination of histories and traditions of people formerly, as well as currently indigenous to the region, of which, the refuge is part.

Integrating native culture with the refuge's interpretation of the present environment is an important goal of the refuge.

Roads in many ways are not compatible with the natural world. They have in many ways only served to fragment and disturb natural habitat. Historically roads have served the need for human transportation, development, industry, military purposes, and for resource extraction. The purpose of wilderness protection runs counter to these long-held human traditions. Please find ways in which the refuge can continue to be managed without resorting to additional roads. I ask that the USFWS retain the language in the Preferred Alternative which would permit the closure of any administrative trails no longer needed for the hauling of water.

I believe that the Leave No Trace Program should also be applied to the backcountry and along motorized travel corridors. The public would greatly benefit in better understanding their impact upon the fragile desert environment. Law enforcement officers charged with the protection of the refuge as well as the safety within, should be trained and also encouraged to offer information on LNT as well as the natural resources of refuge, to members of the public visiting the refuge.

CPNWR, with regards to it's management of visitor access to the refuge must not implement the Preferred Alternative. All motorized corridors of 200 feet should allow only the travel on established roadways and allow pulloffs only as far as necessary to permit the passing of other vehicles. Please do not permit a blanket 100 foot wide corridor. Please restrict group sizes on refuge roads to 5 vehicles per party with 16 people as the maximum allowed.
I favor the current permitting process with no phone or web based system. Continue to allow the access of pack stock under special use permits.

No Off Road Vehicles such as 4x4s, motorcycles, or all-terrain-vehicles should be permitted from operating in refuge wilderness.

Thank you for allow the public the opportunity to comment.

Robert Herdliska
2631 W. Prato Way
Tucson, AZ
85741

September 13, 2005

RE: Public comments on Draft Comprehensive Conservation Plan (CCP), Draft Environmental Impact Statement (EIS), and Draft Wilderness Stewardship Plan

Regarding wildlife preservation, the plan needs to restore wildlife movement corridors across highway 85 and remove all fences that could prohibit movement of Sonoran pronghorn. The pronghorn recovery team has made it clear that reestablishing movement between habitats is crucial to the recovery of the Sonoran pronghorn. All management activities proposed/performed in wilderness should be evaluated for need and method of completion under a Minimum Requirements Analysis. As with Sonoran pronghorn, the USFWS should fully explore and document the relationship between desert bighorn sheep and the necessity, use, and effect of water tanks on sheep populations. Consider redeveloping existing water tanks in wilderness to improve their capacity and collection systems, as well as making the tank levels more apparent from the air. Explore the feasibility of using photovoltaic systems to monitor and remotely transmit water levels.

Non-native plants are one of the biggest threats to the long-term health of the Sonoran Desert. The visitor orientation video and permit for the refuge should incorporate aspects of educating the public about the spread of noxious weeds and how to prevent it. All Border Patrol vehicles that enter the Refuge should have their undercarriage cleaned before entering the refuge.

Regarding Administrative trails, the USFWS must continue to explore ways in which it can complete the necessary management actions without developing new roads. Roads disturb and fragment habitat and they do not belong in wilderness. Close unnecessary administrative trails in the wilderness. Retain the language in the preferred alternative under this section that allows permanent closure of all administrative trails if water hauling is deemed no longer necessary.

Regarding visitor access, the current permit process should be kept in place. Switching to a phone or web based system could encourage use-use of the Refuge. Pack stock should continue to be allowed under special use permits. Off Road Vehicles such as four wheelers, motorcycles, and three wheelers should be expressly prohibited anywhere in the refuge.

I feel that the Cabeza Prieta National Wildlife Refuge is an outstanding ecological, geological, cultural, and educational national treasure, and should be protected from destructive influences while encouraging the protection and recovery of the Sonoran Desert's unique fauna and flora.

Thank you for your consideration,

Jennifer Becker

Tucson, AZ

6845 Pintail Dr
Flagstaff, AZ 86004
Sept 13, 2005

Mr. John Slown, Biologist/Conservation Planner
Cabeza Prieta Planning Team Leader
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, NM 87120

Dear Mr. Slown,

I would like to submit the following comments regarding the Cabeza Prieta NWR Draft Comprehensive Plan and have my name added to the list of "interested publics" for this issue.

It is important to recognize the history of the CPNWR and its importance to the State of Arizona. Arizona sportsmen have been involved in the restoration and maintenance of wildlife habitat in SW Arizona for many years. It is of utmost importance that the CPNWR continue to be managed in the best interest of the wildlife. This must be the priority. Management for wilderness characteristics must be secondary. This means that continued reasonable motorized access for wildlife management purposes must be maintained. Existing access routes must be maintained.

With the continual increase in population in AZ, it is important that areas such as CPNWR be managed to provide the highest possible chance for wildlife to thrive. "Hands off" is not management, it is neglect! Many areas of the State provide just that, a hands off approach in wilderness areas. This must not be allowed to become the mode of operation here. Of particular importance is the ability to supply additional water in drought years. Procedures must be in place to rapidly respond to drought conditions.

With the current problem of immigration across this landscape, it is important to recognize that the threat is not from wildlife supporters whether they be Federal agency personnel, State agency personnel or conservation minded NGOs. They are the "good guys" that are intent on pro-actively managing the wildlife and their support systems. To block their access in any way is a disservice.

I support alternative 5 and can live with alternative 4. Alternatives 2 or 3 are completely unacceptable and would work to the detriment of the noble purposes of the Cabeza Prieta Wildlife Refuge.

Sincerely,

Bruce H. Johnson (submitted via email on 9/13/05)

September 13, 2005
Mr. John Slown
Biologist/Conservation Planner, USFWS
NWRS, Southwest Region, Planning Division, PO Box 1306
Albuquuerque, NM 87103

Dear Mr. Slown,

The draft comprehensive Conservation Plan (CCP) for the Cabeza Prieta National Wildlife Refuge falls far short of protection from what is most damaging, motorized use. This tolerance of vehicular use in the designated wilderness is totally intolerable.

The issues the Border Patrol face are really challenges, but they must be resolved without destruction to this precious wilderness. The FWS have the responsibility of safeguarding this irreplaceable area, and you are urged to adopt a management plan that will be responsive to that concern.

Sincerely,
Barbara Birdsey

September 13, 2005
Dear Mr. Slown:
I want to petition you to keep all motorized vehicles out of the Cabreza Prieta Wilderness area except the road used to interdict illegal persons entering the USA.
This area of Wlderness is very fragile and is governed under the Wilderness Act of 1965, which states that no invasion may be made by any motorized vehicles.
Thank you for acting on this matter.

George M. Williams
309 E. Edgewood
Sidney, OHIO 45365

I have also attached my comments so that format will remain, if you'd rather. Thanks. Nancy Zierenberg, September 13, 2005

John Slown, Div. of Planning
USFWS, NWRS R-2
POB 1306
Albuquerque NM 87120
john_slown@fws.gov

Hello planners,
I've been to Cabeza Prieta a few times and it is incredibly special each time. I'm counting on you to prioritize its protection in the fullest sense, and to take all measures necessary to protect its natural inhabitants from unnatural invasions of vehicles; in the air as well as on the land. The border patrol, human coyotes, servicemen using vehicles as toys (wreckreation) have all taken a big toll on the refuge in these latest years and we need to do all we can to prevent further degradation from these and others who have no regard for this preserve area.

There are few large areas like this left in our nation; areas still relatively pristine and large enough where a human can get away from society for awhile. These areas are precious and will prove to be more so in the future. Preserving them intact now will ensure that the jewel remains for others down the line.

The area's wildlife and plantlife are uniquely adapted to survive there. The pronghorn are only one of these species that we need to preserve habitat for. And they obviously evolved to need large contiguous areas to survive. We certainly don't want a few specimens of zoo-like pronghorn, remnants of once truly wild animals held in enclosures for people to view. We want wild, continuously evolving flora and fauna, and I think the American

people have charged USFWS with the responsibility for keeping these components in a healthy and thriving state in perpetuity.

I am not up to date on what is happening with Mexico/U.S. border fencing, the horrendous plans for mega-lighting up the border area, vegetation clearing along the border and other things I've heard are in the works. Although wildlife friendly fencing to stop illegal vehicular use (including border patrol) might be a needed answer to stop the creation of the multitude of roads being created, the rest of the efforts I've heard about to curb illegal immigration are too horrendous for words. Those things would certainly not amount to a wildlife friendly situation and would probably contribute to the demise of the pronghorn.

It is good that USFWS is trying to work with border patrol to make sure their agents understand the fragility of this desert, but I really hope that when it comes to law enforcement within the refuge boundaries that border patrol action is limited. Their going off roads should never have been allowed, flights over wilderness are certainly disruptive—not only to people, but also to wildlife--and should be very limited (eliminated would be nice), and they simply do not get needed training (or maybe it just doesn't work?) to respect and take care not to damage the workings of this desert and the cultural resources there. They have a different bottom line than a USFWS employee and if a suspected illegal entrant is being tracked, then all else receives secondary consideration and actions not appropriate in the refuge often take place (ie. a chase or driving off a legal road).

Speaking of roads, there are miles of illegally made roads and trails (tracks) that need to be closed. Some of these were made by servicemen and some by illegal entry. At any rate, they need to be obscured so they are no longer used illegally and some kind of patrolling planned to show a law enforcement presence in problem areas. In the old days (when the National Park Service was at its height) perpetrators were forced to rake out their own illegal tracks and do repairs, no matter how hot it was, then given a citation. There is merit to this method of curbing illegal vehicle use.

I do not support adding water holes (that always need maintenance) to wilderness areas that are supposed to be pristine and free from human disturbance and influence. I know there are currently many developed water holes in the refuge, though I don't know if USFWS has done any work to determine if they do any good?? Do we know which animals are using these? Do these areas create more hazard than help to the wildlife? Are humans using these? Are stray cattle getting to these watering holes? Do they create some kind of disease or parasite sink? How often is the water in these catchments tested for organisms? Is the maintenance needed to support them worth the damage to the land getting large and heavy trucks in with water?

I think we need to answer these questions before going further with the non-natural water develpment.

Although it's nice to have a fancy new office, do visitor numbers support building new facilities at this time? I know for certain that the refuge needs much more USFWS presence on the ground and feel that should be a first priority. Good and comprehensive training for your people should also be a major priority. Having people in the field meeting the public using the resource goes a long way toward reining in bad or illegal behaviors. That's a proven fact. It also works in favor of USFWS when your employees have been trained properly to deal with people and can effectively educate and provide helpful information to them while in the field. When people see officials patrolling, they know then that the resource is important

enough to the agency to protect, and it allows the agency to keep a better handle on what is really going on within the refuge.

And lastly, invasive species need to be inventoried and a strategy prepared to deal with them. That includes cattle. Hopefully they are shot on sight. The desert experienced a plethora of invasive plant outbreaks this year due to timing of rains. The Sahara Mustard was out of control and there are many other species right behind it. I would ask that the USFWS develop a comprehensive list of invaders, then prioritize for removal and continual control of the most egregious ones. For annuals like Sahara Mustard, it may be too late, but there may be ways in bad years to at least focus on certain areas where it competes heavily with natives. For others, like some invasive perennial grasses, there may be ways to keep them from spreading further into the refuge. A well thought out plan and training for all employees on recognition of these invaders is certainly warranted.

On the flip side of this, I would certainly support the refuge working to build a local seedbank and developing a restoration nursery of native plants for those areas devastated by illegal off-road use and subsequent closure of those. There are also probably some camping areas that have suffered heavy disturbance that will need resting. Use of prickly natives, or even use of rock can help deter people from areas that need to recover.

In closing, I would hope that USFWS will prioritize to the fullest the protection of the natural qualities that made this a wildlife refuge in the first place. It is a rare chunk of land that offers solitude, quiet, a unique study of special plants and animal life adapted to this amazing desert and should be left alone to just "exist" as much as possible.

Nancy Zierenberg
1755 W Calle Pacifica
Tucson AZ 85745

Arizona Wilderness Coalition
Working Together to Protect Arizona's Wild Lands and Waters
PO Box 2741 Prescott, AZ 86302 - (928) 717-6076 - www.azwild.org

John Slown, Biologist/Conservation Planner
USFWS, NWRS, Southwest Region, Planning Division
P.O. Box 1306
Albuquerque, NM 87103

RE: AZ Wilderness Coalition Comments for Cabeza Prieta NWR Draft Comprehensive Conservation Plan

Dear Mr. Slown:

Thank you for this opportunity to offer comments on the DEIS for the Cabeza Prieta NWR. The Arizona Wilderness Coalition's (AWC) mission is to permanently protect and restore Wilderness and other wild lands and waters in Arizona for the enjoyment of all citizens and to ensure that Arizona's native plants and animals have a lasting home in wild nature. The AWC has a membership of about 1,000 people. The AWC played a significant role in the 1990 Arizona Desert Wilderness Act, which Congressionally designated 803,418 acres of the Refuge as Wilderness. The Cabeza Prieta NWR is the largest National Wildlife Refuge wilderness outside of Alaska and the USFWS has the privilege and responsibility to protect this enduring resource wild America, there is no other place like it!

First, it is important to recognize that management of illegal foot and motorized traffic crossing the international border onto the Cabeza Prieta and all other lands adjacent to the border is correctly identified as outside the scope of this planning effort. The AWC understands that this is of utmost management concern presently, but we also recognize the need to plan for a future without these pressures. However, we would like to preface our comments by stating that comprehensive reform of our nation's immigration policies will be necessary to control our borders in a secure, safe, humane, and environmentally sensitive manner. Please continue to work collaboratively with the Department of Homeland Security in securing our borders and managing our Wildlife Refuges.

Sonoran Pronghorn

2.5.1.1.1.2 Developed Waters

It is understood by the AWC that recovery of Sonoran pronghorn requires the development of surface water catchments in the Cabeza Wilderness; this is not a desirable wilderness management practice, but necessary under the provisions of the endangered species act and decisions made by the recovery team in the recovery plan for this species. The AWC supports Alternative four for this management goal with the addition of the last paragraph from this section in alternative three, which directs the refuge to place greater emphasis on working with the air force and BLM to develop waters on their lands as well. Lastly, this section should clearly state that the necessity, use, and maintenance of these waters would be reevaluated when the Sonoran pronghorn reach recovery goals.

2.5.1.1.1.6 Fencing

The AWC fully supports restoring wildlife movement corridors across highway 85 and removing all fence that could prohibit movement of Sonoran pronghorn. The recovery team has made it clear that reestablishing these habitats is crucial to the recovery of the Sonoran pronghorn.

2.5.1.1.1.8 Habitat Restoration Research

Research should not just focus on "use" of developed waters by Sonoran pronghorn, but the long-term positive and negative affects of providing unnatural sources of water. Also, research on the how motorized travel corridors (inside and outside wilderness) have disrupted and have the potential to disrupt hydrologic cycles (sheet flow) such that it affects vegetative cover and forage available for Sonoran pronghorn.

2.5.1.2 **Desert Bighorn Sheep**

2.5.1.2.1 Developed Waters

The current practice of hauling water to developed tanks inside the Cabeza Prieta Wilderness for management of desert bighorn sheep populations is not desirable from a wilderness management perspective, but it is understood by AWC that this use did occur before the refuge wilderness was established and it was Congress's intention that it would continue as long as the USFWS deemed it necessary for fulfilling the purposes for which the Cabeza Prieta NWR was created. This being said, there has been tremendous controversy over the maintenance, development and redevelopment, and possible removal of these waters in the Sonoran Desert and particularly at the Cabeza Prieta NWR. As with most wilderness advocacy organizations the AWC would like nothing more than to have wilderness without the administrative use of motorized equipment and vehicle ways inside wilderness, but the reality and legal mandate is that the Wilderness Act of 1964 does allow for exceptions to the general prohibitions of mechanized travel and motorized equipment, provided they are minimum tools necessary for the administration of the area as wilderness. Also integral to understanding the issue of developed wildlife waters in Arizona's Wilderness areas and all public lands are that the state of Arizona retains primary responsibility for the management of wildlife on all lands. In Arizona, an integral part of Arizona Game and Fish Department's desert bighorn sheep management is the development and maintenance of wildlife waters in desert bighorn sheep habitat.

AWC supports the proposed alternative to redevelop existing tanks in wilderness to improve their capacity and collection systems, as well as making the tank level more apparent from the air. The feasibility of using photovoltaic systems, such as those mentioned for Sonoran pronghorn tanks, to monitor and remotely transmit water levels should be explored for these tanks as well. It should be explicit in this section of the preferred alternative that all management activities proposed/performed in wilderness will be evaluated for need and method of completion under a Minimum Requirements Analysis.

The AWC also supports the concept of studying the relationship of desert bighorn sheep to developed waters. The University of Arizona study that is currently underway in the Sierra Pinta Mtns. will not be the end of the developed water debate on desert public lands and so it should not be treated as such in this management plan. Normally science is never a one shot deal that either proves or disproves theories, but a series of concepts that are continually challenged creating a refined theory that is still open for debate. If the USFWS insists on carrying forward the concept that this one study will provide the answer to the developed water question, then the opposing actions should read exactly the same in the preferred alternative. Currently, if the study finds that waters benefit sheep then new waters "may be proposed" and if the study finds that waters are not beneficial to sheep "the refuge will consider removing such waters". The AWC recommends

making the language exactly the same to limit any potential misinterpretations of a very controversial issue.

2.5.1.2.3. Population Goal

The affected environment or any other section of the document failed to explain why desert bighorn sheep numbers have consistently declined since 1993, it can only be assumed that disease from domestic livestock is still affecting the population and the long-term climate change? Is the goal of 500-700 animals reached when the survey data is extrapolated using the 95% confidence interval and the upper range of the population estimate is over 700 or the lower range of the estimate is over 500? Please explain what the indication is that this goal has been reached.

2.5.1.3.5 Long term Monitoring

This proposed action seems like an excellent tool for future management.

2.5.1.3.5 Exotic/Invasive Species

The preferred alternative should also incorporate the following comments in relation to exotic/invasive species. The visitor orientation video and permit for the refuge should incorporate aspects of educating the public about the spread of noxious weeds and how to prevent it. The refuge staff and volunteers should also pull Saharan mustard when found, as hand pulling of small populations can be effective. Border Patrol vehicles that are used along various locations of the border should be cleaned periodically and after traveling in heavily infested areas before entering the refuge.

2.5.2.1 Minimum Requirements Analysis

Minimum Requirement Analysis is a documented process used for determining the appropriateness **of all actions affecting wilderness**. The development of programmatic MRAs for similar tasks to be completed in wilderness is an acceptable method to limit redundancy. The MRAs in the appendix have been reviewed and they support the preferred alternative. The AWC supports the use of the MRA process to complete administrative tasks to protect the wilderness resource; we also support the use of primitive/traditional tools in wilderness to the fullest extent. The decision to complete a task based completely on time, money, or even impact to visitors because a work crew using the primitive tool may stay longer at the project site must be balanced with the preservation of primitive/traditional skills. It is the privilege of the UFWS to help foster the retention of primitive/traditional skills that are being forgotten as technology marches forward.

The AWC recommends that since various administrative trails are used across the entire refuge to access wildlife waters in wilderness, there maybe some different impacts in different locations, such as those to Sonoran Pronghorn in their habitat. It may be desirable to develop two or more programmatic MRAs to address actions that could take place in different places on the refuge as the resources change across the landscape.

2.5.2.2 Abandoned Vehicle Removal

The AWC fully supports this management action and encourages the service to aggressively pursue getting the military to assist in removal of abandoned vehicles by helicopter.

2.5.2.4 Administrative Trails

The closure of any administrative trails in the Cabeza Wilderness is an excellent action. The service should continue to explore ways in which it can complete the necessary management actions and close more miles of administrative trails. Please retain the language in the preferred alternative under this section that allows permanent closure of all administrative trails if water hauling is deemed no longer necessary.

2.5.2.5 Wilderness Impact Monitoring

The preferred alternative should adopt some threshold for percentage of degradation or level at which action to prevent degradation will occur. Please address what actions would potentially be used to prevent impacts from becoming worse? How would monitoring be carried out?

2.5.2.6 Border Law Enforcement

Extensive wilderness training for border patrol personnel, as described in Alternative three, would best protect the resources of the refuge.

2.5.3.1 Managing Visitor Access

The preferred alternative is not acceptable and should be changed to alternative three for this section. Alternative three should then be changed to add the following restrictions on visitor access. Any motorized corridor of 200 feet should only allow visitors to travel on established roadway and to pull off only as far as needed to allow other vehicles to pass. There should not be a blanket 100-foot wide corridor. The current permit process should be kept in place and not moved to a phone or web based system. The population of Arizona and the desire to recreate in more remote places will only increase and so adopting more restrictive policies now will help to protect the refuge in the future. To do any less would not adequately protect the resources of the refuge. The preferred alternative should clearly prohibit Off Road Vehicles such as four wheelers, motorcycles, and three wheelers. Group sizes on refuge roads should be limited to 5 vehicles per party and 16 people. The refuge does not need any more roads developed for visitor access. Pack stock should continue to be allowed under special use permits.

2.5.3.3 Implementing the Leave-No-Trace Program

This is a spectacular reason to interact with the public not only at the refuge office, but also in the backcountry and along motorized travel corridors.

2.5.3.5 Interpretation of Natural Resources

This section is titled differently in alternative four as "environmental" instead of "natural" resources. This section in the preferred alternative should be retained and expanded to include the parts of Alternative three. The general refuge orientation video and the Carhart Center Wilderness Awareness video should be included as parts of the interpretation. Opening of the Childs Mountain facility to the general public would go a long ways to fulfilling the goals of the environmental education program.

2.5.3.6 Managing Visitor Camping

This action alternative is not clearly explained. Is the special use permit for parties exceeding eight campers/people for the wilderness and car camping on the non-wilderness lands? This seems like an excellent number for overnight camping to retain the primitive experience of the refuge.

2.5.4 Goal: Cultural Resources Management

The Management of cultural resources and the implementation of an environmental education program should be intertwined. Stories of the past cultures that inhabited the refuge and surrounding area are an integral part of environmental education. The service should work closely with the Tohono O'odham and other native tribes along the Colorado River to document and share their ancestor's use of the land, myths, and rituals. Understanding cultural resources is integral to the desire to protect them.

2.5.5 Staffing

The service should add at least one more Outdoor Recreation/Outreach Specialist to the staffing requirements for the Cabeza Prieta NWR. Also, law enforcement officers should be trained and encourage to interact with the public and offer information about LNT and the natural resources of the refuge.

Thank you very much for this opportunity to provide comments on this draft plan. Please continue to keep the Arizona Wilderness Coalition on your project mailing list. The public notice for the hearings held on the release of this document was inadequate. We did not receive our postcard until 4 days prior to the meetings. At a minimum two weeks notice is needed to get the best attendance at these meetings. Once again, thank you, and feel free to contact us with any concerns or questions you may have about our comments or your management of the Cabeza Prieta National Wildlife Refuge.

Sincerely,

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USFWS, NWRS, Southwest Region, Planning Division
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Albuquerque, New Mexico 87103

Re: Cabeza Prieta National Wildlife Refuge
Draft Comprehensive Conservation Plan
Environmental Impact Statement and Draft
Wilderness Stewardship Plan

Dear John:

Having visited and camped on the Cabeza Prieta National Wildlife Refuge several times over the years I recognize the need to protect this fragile landscape and its wildlife. In my view two major issues of the DCCP need to be discussed more fully in order to fulfill the mission of the USFWS.

The dismal forecast of a continuing long term climate change that is projected to be prolonged with a cycle of relative drought (p.168) could have drastic to devastating consequences and should be greatly emphasized. From a long term view the lack of forage and adequate surface water will, no doubt, accelerate. If the larger and more obvious mammal population estimates of Sonoran Pronghorn has reduced from 179 in 1992 to 21 in 2002, and the Desert Bighorn Sheep from 480 in 1993 to 323 in 2002 the importance of surface waters need to be better understood. I suspect radio collars appear to be one of the major ways to better understand this issue and should be encouraged. At the same time I thoroughly support the wilderness concept and values. Water should be supplied in the wilderness areas for these animals until this issue is completely understood, especially in these dire times of drought and population declines.

Keeping your figures in mind of population reductions, I do not see how a hunt on the Desert Bighorn Sheep can be considered at this point, even if it is only the older males that are supposedly taken out. They are still a valuable asset to the bighorn community and can still be viewed and appreciated by the general public.

Establishing population goals for species ends in a management roll where natural processes become secondary, especially in the case of removing predators. They too have a very important roll to play in all of this. This seems like a step backward in wildlife management.

If "wildlife comes first in the National Wildlife Refuge System" then human interruptions and the pressure of taking wildlife (see item G, p. 1 & 2) should be at the bottom of priorities. I totally support all the other "Goals of Refuge Planning."

I would like to simply identify with one of your Alternatives, but as you can readily see there is no such Alternative. I strongly believe that with the increased pressure of human populations these areas will become more important if we are going to protect wilderness values and wildlife for all to enjoy. I know the pressure to hunt is great, but the harvesting of animals need not always be satisfied at the expense of the target animal and those who enjoy viewing them in their natural and wild surroundings.

Thank you for the opportunity to respond.

Dan L. Fischer

September 14, 2005

Dear John:

I have a few comments re the CPNWR Management plan as I see it on the cd sent to me.

First, let me say the informational content is very good. My reading of it has been cursory due to the very large size and the timing of the comment period (when I had other, pressing obligations elsewhere).

It seems that Cabeza can do nothing that affects military or Border Patrol wants or needs. That is most unfortunate. The BP, as far as I can see, is without interest in, or commitment to, the natural world.

p. 28 1.9.3 seems to make clear that hunting, fishing, wildlife observation, photography, environmental interpretation and education are prioritized in just that order. I think that, too, is most unfortunate.

You appear to demand that tourists adhere to an ethic of doing no harm while you allow hunters and law enforcement to use the area as they will for their sport or their job.

I would ask why was the first plan--on which many of us worked long and hard--withdrawn in 1999? Were the comments submitted then considered seriously in this version?

p. 63 alternative #1 is referred to as a No Action Alternative, but it has a lot of de facto changes from what was happening up to 1999.

Alternatives 3-5 indicate that, in fact, you plan to eliminate as many coyotes as possible from the Refuge. With the pronghorn numbers as low as they are, and since permitted coyote numbers are to be tied to ideals of pronghorn numbers, you could start exterminating coyotes the second this plan is approved. But they are native, watchable mammals to the Refuge as well.

Although Alternatives 3-5 have many valuable additions to monitoring and general knowledge, they set up mule deer, small game, predators for hunting. A Wildlife Refuge should not be a hunting preserve. I strongly object to replacing native predators with human predators. Such a policy mocks the idea and the reality of wilderness.

I vote no and no to Alternatives 4 and 5. I think you are unlikely to implement any reasonable management scheme until significant progress is made on the Border issues.

Good luck.

Annita Harlan, Ph.D.
Research Associate
Ecology and Evolutionary Biology
University of Arizona
Tucson, AZ 85721

August 14, 2005

mr slown,
i respectfully submit the following comments in reference to the comprehensive conservation plan, eis,& wilderness stewardship of the cabeza prieta:
1. the primary efforts, xpenditures of public revenues, should be for wildlife habitat, wildlife corridors, & wildlife species.especially for the endangered sonoran pronghorn & the desert bighorn sheep.
2. pls consider removing any barriers to the migration of species, especially the two mentioned above. this would be across hiway 85 or any other areas with migration barriers.
3. vehicles should be restricted to xisting roads. vehicles should only be allowed to pull off the road the width of their vehicle to allow passage of an oncoming vehicle.
4. the border patrol should be utlized in disseminating leave no trace policies to all folks they encounter.
thankyou for the opportunity to comment. i have travelled once in the cabeza & it was stunning. the xpanse & the immensity of the area can reduce one to a humble state. i am so thankful that our ancestors had the foresight to declare this refuge & especially the wilderness designation. this is certainly a reminder of our responsibility to be the best of stewards for the land & for the wildlife habitat & species.
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14 September 2005

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POB 1306
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RE: Cabeza Prieta National Wildlife Refuge Draft Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Stewardship Plan

Mr. Slown and planning team,

The mission of the Arizona Native Plant Society (ANPS) is to promote knowledge, appreciation, conservation, and restoration of Arizona's native plants and their habitats. ANPS has an interest in the future of Cabeza Prieta National Wildlife Refuge as an important natural area that preserves native plant habitat, and would like to submit the following comments in regard to the Draft Comprehensive Conservation Plan, Environmental Impact Statement, and Wilderness Stewardship Plan:

Invasive plants and animals. The ANPS Conservation Committee has identified invasive species as its top conservation priority. We support efforts to inventory, eradicate, and control invasion of non-native species at CPNWR, especially the removal of fountain grass (*Pennisetum setaceum*) and inspection/cleaning of vehicles and clothing for seed and plant matter prior to approved admittance onto the CPNWR. Please work with the Mexican government to control the spread of invasive species along Highway 2. We look forward to having opportunities for our volunteers to participate in efforts to address invasive plant species on the refuge.

Off-Road Vehicle Use. Tracks and roads related to illegal immigration, including those maintained by the Border Patrol, need to be eliminated and restored to pristine desert conditions.

Air traffic. Studies have shown that overhead flights, especially low ones, stress the wildlife below (not to mention the human users). ANPS is also concerned about pollution and litter resulting from aircraft.

Habitat fragmentation. Roads and heavy human use fragment habitat and facilitate introduction of non-native species. CPNWR's road system (illegally created and otherwise) should be inventoried and evaluated. All superfluous roads, including those related to illegal immigration and Border Patrol activities, should be eliminated and restored to a natural desert condition. Fragmentation is also exacerbated by fencing. The border fence is certainly inadequate to keep illegal entrants from crossing, but also illegal vehicles, which cause a more intensive disturbance. ANPS supports solutions which minimize border porosity to immigration yet allow ample movement of native wildlife species such as the Sonoran pronghorn.

Restoration. ANPS supports science-based restoration at CPNWR. Support and facilities to collect and grow out seeds of locally-collected native species will be integral to the success of restoration efforts. Restoration should occur along unnecessary roadways and in all areas or overuse and disturbance.

Funding. Effective natural resource management is not inexpensive; ANPS supports adequate funding for USFWS to manage the precious resources at CPNWR in the face of the immense ecological and anthropocentric challenges that it faces.

ANPS appreciates the opportunity to comment the management plan for Cabeza Prieta National Wildlife Refuge. Since this refuge is held in perpetuity for all American citizens, we are thankful that the Service recognizes the importance of the public process, the National Environmental Policy Act, and the Endangered Species Act. Please keep us informed of decision making that affects this refuge and others throughout Arizona.

Sincerely,

Carianne Sienna Funicelli

Carianne Funicelli
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September 14, 2005

John Slown
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Cc: Roger DiRosa, Manager, Cabeza Prieta National Wildlife Refuge

RE: Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan

Dear Mr. Slown,
Defenders of Wildlife submits the following comments on the Cabeza Prieta National Wildlife Refuge Draft Comprehensive Conservation Plan (CCP). Defenders of Wildlife has nearly 500,000 members, 8,300 of whom live in Arizona, and is dedicated to the protection of all native wild animals and plants in their natural communities. Defenders of Wildlife has been actively engaged in the management planning process for Cabeza Prieta National Wildlife Refuge (Cabeza Prieta NWR)

for over a decade, and has submitted comments at every opportunity during this time.
Cabeza Prieta wildlife refuge is one of this country's most spectacular. The refuge is home to the largest refuge wilderness area outside of Alaska. The refuge protects the heart of the Sonoran Desert – the most biologically diverse desert in the world. The refuge and the adjacent federal lands form one of the largest undeveloped expanses of land left in America. And the refuge is the last stronghold for the Sonoran pronghorn in the United States, North America's fastest animal.

All of this is at risk, however, to the unprecedented flow of people crossing the U.S.-Mexico border at the refuge and subsequent law enforcement activities. According to the draft management plan, "estimates of illegal travelers crossing through the refuge increased from 4,366 in 2001 and 8,069 in 2002." (CCP at 224). In fact, that number has soared to as many as 200 a night,[1] and shows no signs of going down. Yet the Fish and Wildlife Service (FWS) suggests virtually no remedies or actions to protect the refuge from this most serious threat in its "comprehensive" "conservation" plan for the refuge.

[1] LoMonaco, Claudine. 2005. "Migrants intrude; scarce pronghorn die." *Tucson Citizen*, July 1, 2005.

The CCP at time reads like a fantasy novel: contemplating public use camping programs in the midst of a war zone. Throughout the CCP, the FWS proposes public use programs and management activities as if the border issues had disappeared, when in fact the chances of the border issues to quell in the next fifteen years, the planning horizon of the CCP, is virtually nil. Perhaps the most telling example in the CCP states: "The program of inspecting clothing and vehicles for seeds, while appropriate, would probably have little impact compared with the volume of non-native plants introduced to the refuge by illegal entrants to the refuge" (CCP at 221).

In addition to the lack of clear planning to address border issues, Defenders has a number of comments on artificial water developments, endangered species management, military programs, and public use programs.

Border Issues
Throughout the CCP, the FWS peppers in statements that in total paint a crisis facing the refuge caused by illegal border traffic and enforcement:

> "An increase in Border Patrol coverage at the Ports of Entry along the entire U.S./Mexico border has resulted in additional crossing occurring at more remote locations such as the refuge. In response to the great increases in illegal trafficking in remote southwestern locations, the Department of Homeland Security and Border Patrol implemented the Arizona Border Control Plan in 2004. This plan increases the number of border law enforcement agents stationed on and around the refuge and relaxes motor vehicle use constraints previously observed." (CCP at 46).

> "In recent years undocumented alien (UDA) traffic in and around the refuge has increased significantly, apparently in response to increased law enforcement in urban
> areas." (CCP at 59).

> "In one area, illegal traffic has created a 61 kilometer (38 mile) road since 1999 that traverses pronghorn

habitat. In addition, there are hundreds, and perhaps thousands, of additional kilometers of single vehicle tracks laid down across otherwise undisturbed desert." (CCP at 166)

Yet the only activities the CCP proposes are training (including the preparation of a video) for Border Patrol and DEA agents "to increase their awareness of appropriate operations in wilderness" (CCP at 60), participation in a multi-agency Border Anti-Naroctics Network (CCP at 60), participating with Border Patrol on apprehensions (with no details specified) (CCP at 60), maintaining bilingual warning signs, and contemplating a vehicle barrier (which will be explored in more detailed in a separate analysis once officially proposed). These are all valuable activities, but they are simply not enough to conserve the resources for which the refuge was established.

The CCP is deficient in both its cumulative effects analysis and in its identification of alternatives to address border law enforcement and illegal entry. In fact, the FWS throws up its

hands, stating that border law enforcement and illegal entry are "beyond control of refuge" (CCP at 132).

Regardless of what actions the FWS thinks it can or cannot propose due to jurisdictional or other constraints, the FWS is obligated both under the National Environmental Policy ACT (NEPA) and the National Wildlife Refuge System Administration Act (Refuge Act) to both identify the environmental problems facing the refuge and analyze the cumulative effects of both the actions of FWS and the actions of other agencies and entities. NEPA requires an agency to consider not only the direct effects of an action, but also the "incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 C.F.R. §1508.7).

A searching inquiry into potential cumulative effects in this instance is particularly imperative in light of both the extensive border-related activities and the highly tenuous status of the Sonoran pronghorn that depends upon habitat within the refuge, and the multitude of other threats that face the pronghorn and other imperiled species. NEPA demands that cumulative effects analysis to be both detailed and quantified. See Lands Council v. Powell, 379 F.3d 738, 745 (9th Cir. 2004) (NEPA analysis "must give a sufficiently detailed catalogue of past, present, and future projects, and provide adequate analysis about how these projects, and differences between the projects, are thought to have impacted the environment."); Neighbors of Cuddy Mountain v. United States Forest Service, 137 F.3d 1372, 1379 (9th Cir. 1998)("To 'consider' cumulative effects, some quantified or detailed information is required. Without such information, neither the courts nor the public, in reviewing the [agency's] decisions, can be assured that the Forest Service provided the hard look that it is required to provide."). Unfortunately, the draft CCP in this instance fails to provide such detailed information, and thus fails to portray a "realistic evaluation of the total impacts" of the proposed management activities and border issues facing Cabeza Prieta NWR. Grand Canyon Trust, 290 F.3d 339, 342 (D.C. Cir. 2002).

The CCP completely fails to attempt any quantification of impacts, including cumulative impacts. While the CCP identifies a litany of environmental impacts to Sonoran pronghorn and designated wilderness (perhaps the two most sensitive resources on the refuge), there is no attempt at estimating the

acres of habitat and wilderness degraded now and predicted in the future under the various alternatives, nor the estimated "take" of Sonoran pronghorn under the different alternatives. Neither is the impact of border activities discussed in a cumulative way with the impact of military over flights, refuge management activities, and recreational activities.

For example, the CCP states "illegal cross-border travel through the refuge, as well as the law enforcement response to that activity, has undeniably effected the Sonoran pronghorn population" (CCP at 224, grammatical error in original). The CCP goes on to state that the "increased level of human activity in Sonoran pronghorn habitat related to illegal border traffic and its interdiction produces significant impact on pronghorn" (CCP at 224). Finally, "increased use of motorcycles and all terrain vehicles under the ABC should thus have a negative impact on Sonoran pronghorn. This impact will be the same for all proposed alternatives and should be considered a significant, cumulative effect" (CCP at 224).

It is not enough simply to state that border activities cause "significant, cumulative effects". The FWS must analyze what those effects are. Importantly, the CCP fails to analyze the cumulative effects of not just border activities, but every activity within the planning area on Sonoran pronghorn. What are the cumulative and synergistic effects of thousands of people crossing the border on foot, scores of illegal vehicles driving off road, hundreds of on and off road vehicle trips made by law enforcement personnel, low level law enforcement helicopter flights, low level military helicopter flights, agency vehicle trips in Sonoran pronghorn habitat to haul water and maintain artificial waters, recreational hunting, camping, hiking, and pack animal use, the spread of exotic species by many of the above activities, and the increasing threat of fire due to the invasion of exotic species?

The Refuge Act and the FWS Refuge Planning Policy (*Refuge Manual* 602 FW 3), both require the FWS to identify and describe:

> significant problems that may adversely affect the populations and habitats of fish, wildlife, and plants within the planning unit and the actions necessary to correct or mitigate such problems.

(Refuge Act, 16 U.S.C. 668dd(e)(2)(E)). While the FWS has correctly identified border issues as the major problem affecting the refuge (although not adequately for the purposes of NEPA, see above), the FWS completely absolves itself to planning "the actions necessary to correct or mitigate such problems." We are sympathetic to the overwhelming nature of border issues, which are driven by global geo-political and economic forces and U.S. immigration and drug policy, well beyond the scope, mission, jurisdiction, and capacity of the FWS. However, it is well within the jurisdiction of the FWS to do everything in its power to protect the resources within a national wildlife refuge, including aggressively trying to influence the activities of and cooperate with other agencies, private parties and other entities. Many, if not most national wildlife refuges are threatened by activities beyond their borders and/or jurisdictions, yet they still attempt to abate those threats.

The FWS has proposed building a vehicle barrier, a project Defenders has publicly supported. A vehicle barrier, however, is only a short term fix, and may result in unintended consequences, like an increase of vehicle traffic from the U.S.

side of the border to pick up undocumented aliens traveling on foot, and a shifting of illegal vehicle traffic to the west side of the refuge.[2] Additional immediate measures are necessary to protect the most sensitive areas on the refuge. For example, the FWS should propose infrastructure, technological, and personnel options to protect the Sonoran pronghorn captive breeding facility, Sonoran pronghorn forage enhancement plots, and Sonoran pronghorn emergency waters.

[2] It is our understanding that a vehicle barrier would first be constructed on the eastern portion of the refuge, leaving the west side of the refuge vulnerable

Sonoran Pronghorn

Section 2.1.1.1.2 Developed waters

Defenders has supported in the past and continues to support the limited use of developed waters for the recovery of the Sonoran pronghorn. We view these as "emergency", short-term. treatments to be used when the population is critically low (as it is currently) and in times of extreme drought. Now that conditions on the refuge have become more favorable, and the population of Sonoran pronghorn is beginning to rebound, the FWS should begin to critically examine the program. While Sonoran pronghorn have been documented using artificial waters, it is still unclear whether they require this source of water for survival, and if so under what conditions. In addition, it is unknown what effect developed waters have on predator populations, and it may be the case that while these waters benefit Sonoran pronghorn, if they benefit predators as well, the program could be a net loss for the Sonoran pronghorn. Developed waters may also bring people (agency officials, undocumented migrants) into close proximity to Sonoran pronghorn and disturb them.

Every developed water that Defenders' staff has visited on the refuge appears unsanitary, clogged with algae and other debris, with non-native bees and other insects swarming about. These conditions need to be studied to determine their effects on Sonoran pronghorn. While the CCP calls for annual water quality monitoring of developed waters, it is unclear if this monitoring includes trapping and sampling of disease vectors, particular biting midges and other insects.

Defenders suggests, given the above uncertainties, that the FWS delay the development of additional permanent developed waters until these uncertainties are answered. Without more reflective management, the program may be doing more harm than good.

Defenders supports the upgrading of developed waters (Section 2.5.1.1.1.2) for the use of Sonoran pronghorn to increase their water collection efficiency and reduce regular maintenance trips. Fewer maintenance trips will reduce disturbance and benefit Sonoran pronghorn.

Section 2.1.1.3 Captive breeding/translocation

Defenders supports the captive breeding program established on the refuge. We were, however, disappointed in the number of capture-related deaths of Sonoran pronghorn in establishing the breeding population within the refuge. Defenders' recommends the appointment of veterinary staff on the recovery team to avoid Sonoran pronghorn health problems in the future.

Defenders also supports translocating Sonoran pronghorn to unoccupied historic habitat, like that found on the east side of highway 85 and that found on and surrounding Kofa National Wildlife Refuge.

Section 2.1.1.1.4 Area Closures
Defenders supports the seasonal closures of Sonoran pronghorn habitat during fawning season. To meaningfully limit disturbance, restrictions should also be placed on agency personnel (FWS and cooperating agencies) in these areas.

2.1.1.1.5 Forage enhancements
As with developed waters for Sonoran pronghorn, Defenders supports the limited use of forage enhancements as emergency, short-term measures to bolster the population during severe drought when the population is critically low. Again, as with developed waters, Defenders urges the FWS to critically

examine the effectiveness of forage enhancements and their unintended consequences before dramatically expanding their use.

Section 2.1.1.1.6 Fencing
Defenders fully supports the removal of fences within Sonoran pronghorn habitat, particular the fence between the refuge and the Cameron allotment on BLM land east of the refuge, where cattle have been removed.

Section 2.4.1.1.1.7 Predator management
While Defenders generally does not support controlling predators to manage other species, it is sometimes appropriate to recover critically endangered species. However, any predator management program must be well thought out and effective. We caution that the use of predator control in the enormous Cabeza Prieta NWR and surrounding federal lands that are home to the Sonoran pronghorn is impractical. According to Bright and Hervert (2005)[3], both experts on Sonoran pronghorn:

[3] Bright, J.L. and J.J. Hervert. 2005.Adult and fawn mortality of Sonoran pronghorn. *Wildlife Society Bulletin*, Vol. 33(1):43-50. known to forage

> "Limited, localized coyote control, such as in areas where newborn fawns exist or in forage-rich areas where adult areduring dry winters, may help reduce pronghorn mortalities in the short-term. However, due to the large areas and scarcity of pronghorn, range-wide coyote control programs likely would be prohibitively expensive and have little chance to make a difference. Our data suggest that large numbers of fawns are likely to die in most years due to lack of adequate nutrition. Predator control targeting fawn survival would be successful only when adequate forage is available to meet the nutritional needs of pronghorn fawns. In addition, bobcats move into coyote habitat when coyotes are removed (Robinson 1961). Removing coyotes may have a negative effect, because bobcats may be more successful than coyotes for longer period of time at reducing pronghorn fawn numbers. Furthermore, nearly complete removal of bobcats would be required to significantly reduce predation (Beale and Smith 1973). Relative densities of bobcats and their habitat-use patterns in the Sonoran desert are not well documented and should be investigated further. Further research also is needed on predation of Sonoran pronghorn fawns."

Desert Bighorn Sheep
The most controversial issue facing the refuge during its last round of planning, and the reason the first draft of the plan was redrawn, is the management of bighorn sheep and the

maintenance of artificial waters. Since the first draft plan was withdrawn six years ago, we are dumbfounded that the FWS has not advanced its and the public's scientific understanding of historical conditions and the current biological needs of bighorn sheep related to artificial waters to quell some of this controversy.

Sheep population objectives

Besides the no action alternative, each alternative establishes a target population for desert bighorn sheep. In each alternative the target population number is compared to "the population

range that was likely supported by resources in the area of the refuge prior to the introduction of disease by domestic stock, the fragmentation of habitats by modern land management practices and the degradation of native habitats from grazing by domestic stock decimated native desert bighorn sheep populations" (CCP at 104). In fact, the preferred alternative goes so far as to state that a refuge population objective of 500-700 desert bighorn sheep is "considerably lower than the population range that was likely supported" in the past (CCP at 104). Yet the CCP later states that "few historic records exist that allow for a meaningful assessment of presettlement bighorn sheep numbers in either North America, Arizona or the refuge" (CCP at 173).

In addition, the population goal for the preferred alternative was developed by compiling and averaging desert bighorn sheep densities in off-refuge ranges. Yet the CCP states that "it should be noted that the habitats used for comparison in establishing the population goal all contain developed waters, as provision of developed water is central to AGFD's management of desert bighorn sheep and no occupied habitats without developed water were available for comparison" (CCP at 104). This is a shocking finding, and one that points to the unquestioned use of artificial waters for bighorn sheep management, regardless of need. In other words, we have no idea what a population of desert bighorn sheep looks like without access to artificial waters.

Artificial watering sources

Even though the CCP states that "there is no definitive evidence that developed waters are absolutely necessary to the conservation of desert bighorn sheep" (CCP at 242), the FWS places emphasis on this management program. Desert wildlife have necessarily adapted to desert conditions, including drought. The justification for introducing artificial conservation measures is to combat artificial, human caused population decimating factors. Yet besides historic overhunting, many of the factors harming bighorn sheep throughout Arizona do not exist on Cabeza. Cabeza's mountain ranges, the primary habitat for bighorn sheep on the refuge, have been protected for over 40 years, most of them in designated wilderness, the highest protection afforded on federal lands. As the CCP states, bighorn sheep are "wilderness-dependent species and, more than any other wildlife species in the desert southwest, is emblematic of wilderness and wildlife places" (CCP at 172), requiring large, undisturbed areas. Bighorn sheep historically would not have migrated to the now dry Gila and Sonoyta Rivers, as is assumed Sonoran pronghorn did, and their historic habitat remains much as it always has on the refuge. The only natural water source traditionally used by bighorn sheep that has dried up is a spring in the Agua Dulce Mountains, due to ground water pumping in Ajo (CCP at 144 and 177). Even the devastating border traffic on the refuge has had limited effect on bighorn sheep because their habitat is largely inaccessible. The only impact that remains from past anthropogenic causes is disease from

livestock. Management should thus focus on managing disease in the population, not managing water, for which the FWS has not provided evidence that water is a limiting factor or necessary to maintain a viable population in the refuge.

In summary, as stated in the CCP: "Desert bighorn sheep habitat on Cabeza Prieta NWR remains essentially intact and bighorn continue to occupy virtually all the species' historic habitat on the refuge" (CCP at 178). If this is the case, then artificial "enhancements" should be avoided, particularly in designated wilderness.

Defenders of Wildlife Cabeza Prieta NWR CCP Comments
Page 8 of 10

While the CCP repeatedly states that the conservation of bighorn sheep was central to the creation of the refuge, bighorn sheep do not appear in the official purpose of Cabeza Prieta which states: the refuge was "reserved and set apart for the conservation and development of natural wildlife resources" (Executive Order 8038 January 25, 1939). Even if bighorn sheep were part of the purpose of the refuge, this does not mean that management should focus on raising the population beyond the carrying capacity of the refuge's habitat, so long as the population remains viable. We also note that according to the draft FWS Mission, Goals, and Purposes policy, "designated wilderness assumes the purposes of the Wilderness Act of 1964 in addition and *equal* to other unit purposes, unless otherwise specified in the wilderness designation" (66 Federal Register 3667), emphasis added). In other words, the refuge should strive to maintain its wilderness as much as its bighorn sheep.

We support the idea of a FWS-University of Arizona study on bighorn sheep on the refuge, although as stated before, we are disappointed the results of that study are not available to inform this CCP. However, from the brief description of this study in the CCP we are concerned that it will not be the comprehensive, scientifically rigorous analysis this issue requires. The study, as described in section 2.1.5.1.2 (CCP at 61) is purely based on sheep movements in relation to watering sources that are experimentally denied. What question is this study designed to answer? If sheep move away from closed watering sources, does that mean they require them and the refuge should reinstitute them? A comprehensive, hard look at artificial waters requires examining not only sheep movements, but sheep use of artificial waters, sheep physiology, sheep diet, sheep population dynamics over time, sheep population viability over time with and without waters, predator population dynamics in relation to artificial waters, and the impacts of waters on non-target species. Without answering these questions, the study will be a waste of time and effort and not resolve the conflict over the use of artificial waters.

In light of the Wilderness Act and the FWS policy on maintaining Biological Integrity, Diversity, and Environmental Health of the Refuge System, management of bighorn sheep in the wilderness mountains of Cabeza should restore or mimic natural ecosystem processes or functions that have been lost, so long as the refuge maintains a viable population of bighorn sheep. Even if a study should "indicate additional waters would benefit the refuge sheep population" (CCPat 104), without the comprehensive examination we outline above, the cumulative effects of the program are unknown. In addition, "benefiting" the bighorn sheep population does not mean artificial watering sources are necessary for the maintenance of viable bighorn sheep populations.

If a comprehensive study does eventually determine that without the maintenance of some of the artificial waters bighorn sheep would disappear from the refuge, we support the

modifications proposed in the CCP to increase artificial water storage capacity to reduce the need to haul water and the installation of photovoltaic sensors.

Bighorn sheep hunt program
We support the provision in Alternative 3 that prohibits hunting of bighorn sheep during years of severe drought (section 2.4.3.2.1, CCP at 94). If conservation of bighorn sheep is a central priority of the refuge, it makes little sense to disturb and "remove" sheep during times of severe stress.

Proposed recreational uses
Sections 2.5.3.2.2, 2.5.3.2.3, 2.5.3.2.4 Mule deer, small game and predator hunting programs
There is no compatibility determination for these programs within the CCP. A compatibility determination is required for all uses of national wildlife refuges. Defenders opposes the expansion of hunting programs on Cabeza Prieta NWR. As we stated in our letter to the 1997 draft Comprehensive Management Plan (CMP) for Cabeza: "Defenders has concerns regarding the impact of proposed trophy deer hunts and small game hunts on the Sonoran pronghorn. [The CCP] does not address the risk of hunters killing pronghorn accidentally or intentionally. Also the increase in people and noise from gunshots could disturb the species. Such disturbance is also detrimental to wilderness values." We also generally oppose predator control (see Sonoran pronghorn section, above).

Section 2.5.3.7 Use of pack animals
While the restrictions proposed for the use of pack animals would reduce the impacts of this use, they are completely unenforceable. There is no way the FWS can enforce users feeding pack animals pelletized food three days prior to entering the refuge, nor, which limited law enforcement staff, is there a way for FWS to enforce trail use. This past summer the refuge experienced a number of large-scale fires. It is both well known that pack animals spread exotic species and that the exotic plant species that have established on the refuge are prone to fire. Because of the severe limitations in the FWS ability to enforce restrictions that would limit the spread of exotic species, pack animal use should be prohibited.

Section 2.5.3.5 Interpretation of environmental resources
Defenders fully supports increasing the refuge's wildlife interpretation and educational programs. However, the development of a road loop in the Childs Valley simply must be abandoned. The Childs Valley is one of the most important areas for the Sonoran pronghorn and includes the Sonoran pronghorn captive breeding facility. It is unlikely that the population of Sonoran pronghorn will be robust enough within the planning horizon to withstand this type of use in prime habitat. In addition, the FWS should not be in the business of creating new roads in refuges, regardless of whether the area in question is designated wilderness or not. Refuges are where wildlife comes first. The development of a road loop in the refuge is incompatible with the FWS wildlife first mission.

Wilderness Management
2.5.2.5. Wilderness Impact Monitoring
We support the use of remote sensing to monitor border impacts in all alternatives.
2.5.2.7. Licensing Uses of the Childs Mountain Communications Site
Defenders views the FAA and military structures on Childs Mountain as incompatible with the purposes of the refuge and Refuge System. These facilities impact both wilderness qualities and bighorn sheep. Regardless of their current lease

agreement, the Refuge Act requires all uses to be evaluated every 10 years. Yet the FWS not only states that the facilities will be left as is until 2018 (i.e. well beyond ten years for evaluation under compatibility rules), the CCP makes the

assumption that the use will be compatible in 2018, only contemplating abandonment if the facilities are no longer need by the FAA and military for "human health, safety, and national security" (CCP at 108). The Childs Mountain facilities must be reevaluated to ensure their compatibility.

Conclusion

Defenders recognizes the extreme challenges Cabeza Prieta NWR faces in protecting its large expanse of Sonoran Desert. We believe our recommendations will strengthen the CCP. Defenders of Wildlife looks forward to continuing our partnership with the FWS furthering our shared goals of conserving the wildlife of Cabeza Prieta NWR >

Sincerely,
Noah Matson
Director, Federal Lands Program

September 18, 2005

We are writing to ask that you make the protection of the wild terrain and he species of the Cabeza a top priority. It cannot be replace if we don not preserve it!!!

Yours sincerely,

Mary Jean Hage
Clive A. Green

12.

1101 W. Snyder Rd.
Ajo, AZ 85321
Sept 11, 2005

Mr. John Sloan
Division of Planing, NWRS R-2
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, NM 87120

Dear Mr. Sloan,

Thank you for your consideration of these comments on the FWS 2005 Comprehensive Conservation Plan for Cabeza Prieta National Wildlife Refuge.
In 1990 many decisions were made by many people, the end result of which was the declaration of 93% of the CPNWR as Wilderness. Regardless of what has happened since and like it or not, this plan is a plan for a Wilderness area. Man's influence is not welcome. This should be a plan of elimination and control, not a plan for how to further pollute Wilderness.
Please look back to 1980 and observe the changes since then. Now look at 2030 and see what CPNWR should look like at that time. I hope your vision for 2030 is a Wilderness Refuge, not a management restricted farm with numerous developments.
Water developments for Pronghorn should be 100 % outside the Wilderness area. They are scientifically wrong, administratively wrong, and conceptually wrong but, I believe, destined under the present FWS administration. That system treats them like captive animals rather than wild ones.
Bighorn Sheep numbers should be targeted to those observed naturally without any obstruction. The area is being impacted even though it is Wilderness. Habitat fragmentation is rife with all the roads that dissect the Wilderness area. Disturbance of wildlife is a given even when all users use the area legally. If water hole improvement is necessary in a few places to mitigate some of the negatives, improve A FEW water holes in such a way that once improved, the approach road can be obliterated and only foot traffic from public roads be allowed as access in the future.
The plan should address management practices that are compatible with Wilderness values. FWS employees, Co-operating agency employees and researchers should be required to treat the Wilderness as such. This is not being done now. New ways to get the work done without motorized intrusions should be found and present and future projects should be planned with foot or horse travel as the preferred methods of access. Yes, it can be done if planned properly. Consider eliminating projects that can not be done in a compatible way.
Trespass cattle and exotic plant species should be reduced with a goal of elimination. This will require additional funding.

One of the really important aspect of the plan should be to look to the future of visitation. NOW, establish rules, regulations and quotas for the end of the time period of this plan. What pressures will develop in 25 years? It is so much easier to establish limits now than it will be to do so under pressure later. Please limit vehicle group size, people group size, and camp site size. Eliminate ATVs now. Do not let them get started. Determine the maximum number of camp sites to be established and develop them as pressure requires.
Regulate all concessioners or commercial enterprises using CPNWR lands. Limit the number of permits and party size. Give no "special areas". All commercial enterprises should be subject to the same restrictions as the general public.
CPNWR is 93% Wilderness. Please develop a plan that recognizes that.
Of the alternatives offered I prefer #3 but it still needs much adjustment.

Sincerely,

Fred Goodsell

Fred Goodsell

THE WILDERNESS SOCIETY

September 14, 2005

John Slown
Biologist/Conservation Planner
USFWS, Southwest Region, Planning Division
P.O. Box 1306
Albuquerque, NM 87103
john_slown@fws.gov

(Sent via first class and electronic mail)

Re: Draft Comprehensive Conservation Plan for the Cabeza Prieta National Wildlife Refuge

Dear Mr. Slown:

The Wilderness Society appreciates this opportunity to provide comments on behalf of our more than 250,000 members nationwide for consideration in the development of a comprehensive conservation plan for the Cabeza Prieta National Wildlife Refuge. The Wilderness Society is a not-for-profit conservation organization devoted to preserving wilderness and wildlife, and fostering an American land ethic. We have a long-standing interest in the protection of our nation's outstanding wilderness areas and in the wise management of the National Wildlife Refuge System. The Cabeza Prieta National Wildlife Refuge is of particular interest and concern to our more than 3,800 members in Arizona.

The Wilderness Society is pleased that the U.S. Fish and Wildlife Service withdrew the Environmental Assessment and Comprehensive Conservation Plan (CCP) for the Cabeza Prieta National Wildlife Refuge ("Refuge") that was released for public review and comment in September 1998. As we stated in our comment letter at that time, we had numerous concerns that the CCP did not adequately protect the outstanding wilderness and wildlife values of the Refuge. The preparation of a CCP offers a valuable opportunity to fully analyze and prepare a comprehensive plan for a refuge's protection and management. Unfortunately, this new draft CCP is not much of an improvement over the 1998 draft. It is incumbent upon the Fish and Wildlife Service ("Service") to fulfill their management duties and to produce a CCP that properly protects the wilderness and wildlife values of the Cabeza Prieta Refuge – goals the Service has failed to accomplish with this draft CCP. As a result, TWS requests that the Service withdraw this draft CCP and issue new documents for public comment and review, prior to approving a final CCP.

1615 M Street, NW, Washington, DC 20036 202-833-2300 www.wilderness.org

President Franklin D. Roosevelt established the Cabeza Prieta Refuge in 1939 in recognition of the tremendous natural resources of the area (Executive Order 8038). Encompassing 860,010 acres, the Refuge is the size of the state of Rhode Island, with over 90% of it designated as wilderness. Endangered Sonoran pronghorn, endangered lesser long-nosed bats and threatened desert tortoise call this parched land home. Far from a barren desert, Cabeza Prieta Refuge harbors as many as 391 plant species and more than 300 kinds of wildlife. The Refuge contains the largest and most pristine wilderness managed by the Service in the lower 48 states; the Cabeza Prieta Refuge is to the Sonoran Desert, what the Arctic National Wildlife Refuge is to Alaska. The management of the Cabeza Prieta Refuge should set the highest standard for the protection of wilderness and wildlife values.

While this draft CCP drops some of the objectionable proposals of earlier draft CCPs, the management plans proposed in the current CCP are still in direct violation of the Wilderness Act of 1964, still degrade wilderness values and fail to reflect a wilderness ethic. In short, each of the five management alternatives outlined in this CCP are fatally flawed because they allow motorized vehicle use in wilderness to continue and completely ignore the border law enforcement issue, the single most important issue facing the Refuge today. The Service must revise the CCP in order to comply with the Wilderness Act and the National Wildlife Refuge System Improvement Act of 1997.

Border Law Enforcement

While there are several issues negatively affecting the Refuge and its resources, absolutely none is more damaging to the Refuge's wilderness than border law enforcement: both the massive influx of undocumented aliens (UDAs) crossing the international border from Mexico, plus the U.S. Border Patrol's attempts to stem the flood of UDAs. Therefore, it is absolutely inexcusable and is an affront to the entire CCP process that the border law enforcement issue is spectacularly ignored in this CCP.

In its "Wilderness Impact Analysis Report," the Environmental Planning Group found that "both law enforcement and use of the refuge wilderness by undocumented aliens and smugglers *were the most significant and extensive impacts affecting the refuge and wilderness*" (pg. 241 (emphasis added)). However, despite its importance, the CCP falsely claims that border law enforcement issues are "outside the scope" of this CCP.

We find it irreconcilable that the Service can acknowledge the destruction to the resources on the Refuge caused by border law enforcement, yet neglect to even analyze and even attempt to mitigate its effects in the CCP. This purposeful omission singularly renders the remainder of the CCP mute, since all refuge operations, management activities and public access are either eliminated or severely limited due to the severity of the border law enforcement issue.

The Wilderness Society finds the purposeful omission of the border law enforcement issue from the CCP unacceptable. Because of the stated severity of the border situation, it is imperative that the Service release a new, more comprehensive draft CCP for the Refuge.

It is understood that assessment and mitigation of the border law enforcement problem on the Refuge is an overwhelming and lengthy task. However, that should not, and legally can not, stop the Service from even attempting to discuss an issue in a CCP. If in future versions of the CCP the Service continues to ignore the most pressing issue at Cabeza Prieta, then the Service has failed the Refuge's resources, failed the Cabeza Prieta National Wildlife Refuge itself and failed the entire National Wildlife Refuge System. It is disappointing that the Service has chosen to be so callous with one of the Refuge System's crown jewels.

Artificial Waters

Congress passed the Wilderness Act of 1964 ("Act") in order to "secure for the American people of present and future generations the benefits of an enduring resource of wilderness" (16 U.S.C. § 1131(a)). For this purpose, Congress established a National Wilderness Preservation System of federal lands "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (16 U.S.C. § 1131(c)).

The overarching mandate of the Wilderness Act is the preservation of wilderness character. Other permitted uses of the land from which the wilderness area was withdrawn may continue *if* they do not interfere with the preservation of wilderness character. Section 4(b) of the Wilderness Act states:

> "[e]xcept as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established and also to preserve wilderness character" (16 U.S.C. §1133(c)).

Therefore, agencies administering wilderness lands have the duty to administer their lands for the purpose for which they were established, but *within the confines of the Wilderness Act*. The term "within" merits some discussion. Literally, when wilderness is designated on a refuge, the preservation of wilderness character is incorporated "within" the existing refuge purposes. In other words, if the purpose of a particular refuge is to conserve certain fish and wildlife populations, then those areas designated as wilderness in that refuge are to be managed so as to conserve such wildlife populations *by preserving the area's wilderness characteristics*.

The synchronization between agency regulations and the Wilderness Act is specifically detailed in Fish and Wildlife Service regulations:

> "[R]ules and regulations governing administration of the National Wildlife Refuge System will apply to wilderness units where said rules and regulations do not conflict with provisions of the Wilderness Act or Act of Congress which establishes the wilderness unit" (50 C.F.R. § 35.3).

Section 4(a) of the Act declares that the Wilderness Act shall be "within and supplemental to the purposes for which the national forests, and units of the national park, and wildlife refuge systems are established." Several state wildlife agencies and organizations have asserted that this "within and supplemental" language somehow releases the National Wildlife Refuge System from the duty of preserving wilderness character in accordance with the Wilderness Act's strict limitations. These assertions are without merit.

"Within" and "supplemental" are two related but slightly different concepts that deserve further elaboration. Literally, when wilderness is designated on a refuge, the preservation of wilderness character "supplements" the existing refuge purposes. Contrary to what some have claimed, the term does not imply that wilderness preservation is somehow secondary to other purposes. Black's Law Dictionary (5th Ed. 1979) defines "supplemental" to mean "[t]hat which is added to a thing to complete it." In other words, when a refuge is designated as wilderness, wilderness preservation is added to the existing purposes of the refuge. The Service's draft policy appropriately directs that wilderness be formally added to existing purposes when a refuge is so designated. The Service's draft Mission, Goals, and Purposes policy, reinforces this requirement by directing that:

> "The purposes of the Wilderness Act become additional and equal purposes of units with designated wilderness, but apply only to those areas so designated. The purposes of the Wilderness Act include both the preservation of wilderness condition and character, and the use and enjoyment of wilderness" (Section 1.16).

This discussion directly relates to the Cabeza Prieta Refuge and the Arizona Desert Wilderness Act of 1990 (ADWA). The language of the ADWA states clearly and unequivocally that "the wilderness areas designated by this title shall be administered by the Secretary of the Interior in accordance with the provisions of the Wilderness Act governing areas designated by that Act as wilderness" (ADWA, Pub. L. No 101-628, Sec. 301(b)). According to § 4(c) of the Wilderness Act, "there shall be no temporary road, no use of motor vehicles, [and no] motorized equipment" within any wilderness area designated by this chapter (16 U.S.C. §1133(c) (1964)). The plain language of the ADWA reads in conjunction with the Wilderness Act and establishes that motorized vehicles are not to be allowed within the Cabeza Prieta wilderness areas, except where necessary to meet the minimum requirements for management of the area *as wilderness*. Therefore, it is not necessary to resort to the legislative history of the ADWA to determine whether motorized vehicles are to be allowed in these wilderness areas.

The Wilderness Act has very clear mandates for the stewardship of wilderness areas on all public lands, including national wildlife refuges:

> "Except as specifically provided for in this Act, and subject to existing private rights, there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act ... *there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no*

structure or installation within any such area" (16 U.S.C. § 1133(c) (emphasis added)).

Thus, the use and management of designated wilderness areas is strictly regulated except when the use is necessary to meet minimum requirements for the administration of the area for the purpose of the Act.

In addition, no motorized access is permitted in wilderness unless it is found to be the "minimum tool" necessary to achieve preservation of wilderness character. The "minimum tool" concept is, in general, one used by land managers to determine what types of management may be appropriate in wilderness for particular activities. "Fulfilling the Promise," the Service's vision document for the National Wildlife Refuge System states:

> "Central to the experience and awareness of wilderness is humility, with its corollary, restraint; restraint in what is appropriate for visitors to do, as well as managers. Restraint is the reason for the "minimum tool" rule, limiting use of our mechanisms to that which is necessary, and necessary not only to manage these areas, but to manage them as wilderness" (FWS, "Fulfilling the Promise," Mar. 22, 1999, pg. 22 (emphasis in original)).

FWS managers apply this standard in administering wilderness areas.

This CCP for Cabeza Prieta Refuge fails to adhere to the Wilderness Act, as well as Service policy, on many fronts – not the least of which is because the Service fails to conduct a minimum tool analysis. In the "Elements Common to All Alternatives" chapter of the CCP, the Service specifically outlines its continued administration of artificial waters:

> "A determination to haul water is based upon observation of water levels by AGFD personnel during weekly aerial reconnaissance, observations by refuge staff conducting field work near the waters, and best judgment of refuge staff considering precipitation and temperature…Water is hauled in a 5,675 liter (1,500 gallon) capacity heavy duty truck. Typically nine to eighteen water hauling trips are made each year" (pg. 51).

All of the alternatives outlined in the CCP, including Alternative 3, "Restrained Intervention," ultimately accept the use of artificial water impoundments as a wildlife management approach. Although Alternative 3 purports that "permanent, artificial structures and installations, no matter how camouflaged, are inappropriate in wilderness" (pg. 87), it goes on to permit the Service to administer water hauling during periods of extreme drought. This is unacceptable and in clear violation of the Wilderness Act. Not only does hauling water in a 5,675 liter capacity heavy duty truck blatantly fail to meet the minimum tool requirement under the Wilderness Act, but hauling water into a designated wilderness area without a solid scientific basis for its necessity is also illegal under the Wilderness Act and a waste of Refuge resources.

Alternatively, the Service's analysis of the artificial water development program must be significantly improved. As written, the alternatives suggest that the only relevant question about

hauling water is how it affects desert bighorn sheep. This falsely indicates that the Refuge's only concern is for the sheep, instead of the well-being of the entire desert ecosystem and the wilderness character of the Refuge – just a few of the Refuge's many important resources. In order to fully comply with the Refuge Improvement Act and the Wilderness Act, the Service must also investigate the extent to which there are negative effects on all of the Refuge's resources from the artificial water developments and the vehicular travel used to maintain them.

Moreover, the Service neglects to consider that Charlie Bell Well and Jack's Well, both in designated wilderness, have windmills to pump water into storage tanks and wildlife drinking troughs. Under the Wilderness Act, a windmill is a mechanical structure and is thereby illegal in designated wilderness areas. This illustrates an obvious disregard for the Wilderness Act in the draft CCP, since the windmills themselves, and the vehicular travel necessary to maintain them, permanently damage the wilderness characteristics of the Refuge. In addition, the disturbance to natural systems from these intrusions is repeatedly implicated in the spread of exotic species. As the CCP states, "Three non-native species, fountain grass, buffelgrass and Sahara mustard, have become established at infestation levels on the refuge. These species have the potential to out-compete native species for resources and reduce the density of native flora on the refuge" (pg. 91).

All five management alternatives offered by the Service in the CCP fail to protect the outstanding wilderness values in the Refuge. Of greatest concern is the Service's general tolerance of vehicular use in designated wilderness areas. While the CCP recognizes the devastating impacts that vehicles have on the Refuge's sensitive desert resources, each management alternative in the plan permits the continued use of vehicles in wilderness areas by the Service, as well as the U.S. Border Patrol. This is a blatant violation of the Wilderness Act and, therefore, the CCP must be changed to comply with current federal law. It is inexcusable that the Service has so flagrantly decided to ignore the primary tenant of one of this nation's most profound environmental laws.

The primary reason the Service gives in an attempt to justify driving motorized vehicles in designated wilderness is to administer artificial waters for bighorn sheep on the Refuge. The Service's policy on bighorn sheep management is problematic on several levels, which will be discussed in further detail in the next section of this letter. But, as the CCP states, the Service lacks the scientific evidence to demonstrate that artificial water developments are necessary for the conservation of bighorn sheep, a species that evolved in the arid Southwest Desert. Despite this, each management alternative grants the use of a 5,675 liter capacity heavy truck to haul water into the wilderness, violating the Wilderness Act, disturbing wildlife and causing irreversible damage to natural resources. The Service has undertaken virtually no effort to analyze, understand the impacts of, or formulate a science-based plan for the management of bighorn sheep. In light of the lack of scientific evidence to support artificial waters, the continued use of vehicles to haul water into Wilderness is inexcusable and should not be tolerated under any circumstances in the CCP.

In sum, artificial water impoundments are illegal in all designated wilderness and, therefore, the CCP must call for their removal and the restoration of administrative trails used to maintain them.

Bighorn Sheep

Cabeza Prieta's CCP must be based on the best available science. Among the goals listed for comprehensive conservation planning is "to support management decisions and their rationale by using a thorough assessment of available science derived from scientific literature, on-site refuge data, expert opinion, and sound professional judgment" (602 FWS 3.3(D)).

The answer to the question of whether water developments or in the Refuge are "*necessary* to meet minimum requirements for the administration of the area as wilderness" must come from the available science. Under the Wilderness Act, the Refuge is prohibited from maintaining artificial water developments by motor vehicles, unless it can show that such activity is necessary to maintain some aspect of wilderness character and that such motorized use is proven to meet the minimum tool requirement. The best available science does *not* show that artificial water developments are necessary to maintain either wilderness character or species populations, nor does the Refuge's artificial water development program meet the minimum tool requirement. In addition, the CCP itself asserts that "…verification that water is a limiting factor on the refuge has not been undertaken" (pg. 231). Therefore, the Refuge's artificial water development program has not, and cannot, pass muster under the Wilderness Act.

While it has been widely-held dogma for decades that artificial water developments are in some way "beneficial" to desert bighorn sheep and/or other wildlife, no studies verify this claim. In fact, the only published, peer-reviewed study addressing the impact of artificial water developments at the Refuge on desert bighorn sheep detected no statistically significant difference of any kind in recruitment, survivability, density, or ewe to ram ratios between sheep populations inhabiting mountain ranges with artificially provided water and those without.[1]

We know of no peer-reviewed studies showing that artificial water developments benefit desert bighorn sheep. Perhaps most tellingly, biologists at the Arizona Game & Fish Department (AGFD) – some of the most historically aggressive proponents of artificial water developments – have concluded that evidence that such developments "benefit" desert bighorn sheep is inconclusive.

In a recent literature review, the research branch chief of the AGFD and two other AGFD biologists concluded that the "[i]ncreased availability of surface water has increased the distribution and or abundance" of certain game species, but did not mention desert bighorn sheep as among those species benefited.[2] The authors admitted that "the ecological effects of water developments are poorly understood and, in some cases, expected benefits to game species and other wildlife have not occurred,"[3] and that "our knowledge of wildlife water development rests on a shaky foundation."[4] The AGFD biologists identified as a "high priority" for research attempting to determine the effects of water development on population performance,

[1] See Broyles & Cutler, Effect of surface water on desert bighorn sheep in the Cabeza Prieta National Wildlife Refuge, southwestern Arizona, Wildlife Society Bulletin, Vol. 27, No. 4, Winter 1999.
[2] Rosenstock et al., Viewpoint: Benefits and Impacts of Wildlife Water Developments, J. Range Management 52(4) 302-311 (July 1999) at 307.
[3] Id.
[4] Id. at 308.

distribution, and habitat use of game species.[5] Ultimately, the authors state that they "*believe* that water developments have benefited some, but not all populations of desert bighorn."[6] The authors do not state the scientific basis for their belief, how the bighorn have "benefited," or where and under what circumstances populations of desert bighorn might be aided by such developments.

In addition, there are numerous studies indicating that artificial water developments may actually *harm* desert bighorn, as well as other species. For example, the increase in available water may increase the range of bighorn sheep predators, as well as the range of non-indigenous wildlife and feral livestock and other exotic species that compete with native wildlife for forage.[7]

Broyles, in his review noted above, cites numerous other studies that found little correlation between the availability of developed water and the success of desert bighorn.[8] In addition, he finds that the primary supposed beneficiaries of water developments – desert bighorn – may in fact use developed water only sparingly, and may be jeopardized by poor water quality at such structures.

Thus, while the artificial or supplemented water structures will allegedly benefit desert bighorn numbers and distribution, the Service has never provided any data to validate the *assumption* underlying the construction of the structures that developed waters improve native wildlife numbers and distribution.

In short, the benefits of artificial water developments in this ecosystem remain, at best, unproven and, at worst, detrimental to species populations.[9]

For years, managers of lands near the Refuge have acknowledged the dearth of studies evaluating the efficacy of artificial water developments. The Department of Defense's 1986 management plan for the Luke [now Goldwater] Air Force Range notes that "[o]ver 66 managed

[5] Id.
[6] Id. at 304 (emphasis added).
[7] See, e.g., Broyles, "Desert Wildlife Water Development: Questioning Use in the Southwest," Wildlife Society Bulletin, 1995, 23(4), 663-675, at pp. 670-71, and numerous studies cited therein; see also DeStefano, et al., Observations of Predator Activity at Wildlife Water Development in Southern Arizona, J. Range Management (53) 255-58 (May 2000) (concluding ungulate predators frequent artificial water developments within Cabeza Prieta NWR and adjacent Goldwater Range).
[8] See, Broyles, 1995 passim.
[9] See also Burkett and Thompson, "Wildlife Association with Human-Altered Water Sources in Semi-Arid Vegetation Communities," Conservation Biology, Vol. 8, pp. 682-90; McCarty and Bailey, "Habitat Requirements for Desert Bighorn Sheep," Colo. Div. Wildlife, Special Report 69 (27 pp.) (authors were "discouraged to find only one report documenting an effect of water development upon the number of sheep"); David E. Brown, Water for Wildlife: Belief Before Science, in Proceedings: Symposium on Environmental, Economic, and Legal Issues Related to Rangeland Water Development (Nov. 13-15, 1997) at 9 (concluding "evidence indicating water developments increase game populations remains nebulous"); Lee and Lopez-Saavedra, Helicopter Survey of Desert Bighorn Sheep in Sonora, Mexico, (Desert Bighorn Council Transactions 1993, pp. 29-32) ("Although managers in the United States have been developing water sources for 50 years, Sonora's sheep population seems to be doing well without such a program"; and suggesting that "ranges in Sonora might be an excellent place to determine whether additional water sources serve to increase sheep numbers and distribution").

waters have been developed for wildlife on the [Goldwater] Range, and the full effect of these waters is unknown. The influence of water developments on desert bighorn and Sonoran pronghorn populations has yet to be fully delineated. The impacts of these waters on the numbers and distributions of non-targeted species remain undetermined" (LAFR Plan, pg. 8-38). It was for this reason that the plan made the following recommendation: "Couple all future water hole development projects with research programs designed to determine the impact of such development on targeted species as well as on other species that may be affected" (Id., Recommendation 8-3).

In 1989, then-Arizona Bureau of Land Management (BLM) director, D. Dean Bibles, concluded that water was likely not necessary in wilderness to support healthy bighorn populations. "The building population of bighorn sheep in wilderness areas would indicate *water is generally not a limiting factor*" (Letter of D. Bibles, Dir., BLM AZ State Office, to Rep. Wayne Owens (July 21, 1989), pg. 2 (emphasis added)). AGFD staff has also concluded that the food supply, not water, will ultimately be "the limiting factor of a bighorn population within suitable habitat."[10]

The presence of native wildlife at naturally fluctuating population levels is an important component of wilderness character. In certain limited instances, habitat modification in wilderness may be necessary to maintain wilderness character. However, structures and installations that modify habitat within wilderness, such as artificial water sources, must meet very strict conditions: "except as necessary to meet minimum requirements for the administration of the area for the purpose of [the Wilderness] Act…there shall be…no structure or installation within any such area" (16 U.S.C. § 1133 (c)). Likewise, all habitat modification in wilderness areas is inappropriate unless necessary to maintain the wilderness character of the area. Where it occurs, such intervention should be designated to be temporary and directed at stabilizing native species.

In short, for decades the Service has undertaken a program to construct, monitor, maintain, and fill artificial water developments at the Refuge without scientific basis of any kind supporting the assumption that these developments benefit desert bighorn sheep. Assumptions do not have a place in CCPs; therefore, this assumption must be removed from future drafts.

If the Service wishes to continue the artificial water development program (despite its illegality, as previously established), the CCP must explain how these activities meet the minimum requirements provisions of the Wilderness Act. Given the utter lack of scientific basis for such a program, it is inappropriate and illegal for the CCP to advocate for the continuation of this program. Instead, the CCP should prohibit all activities and programs that are illegal under federal statute and/or detrimental to refuge resources.

[10] See R. Remington (1989) cited in Wm. Broyles and Tricia Cutler, "Effect of Surface Water on Desert Bighorn Sheep in the Cabeza Prieta NWR," Wildlife Society Bulletin, 1999, 27(4), 1082-1088.

Minimum Requirement Analysis

While we are encouraged by the commitment in the planning materials that any management activity proposed to occur within designated wilderness must pass a minimum requirement analysis (MRA), we are deeply concerned about the provision create programmatic MRAs. As first outlined in § 2.4.2.1 of the CCP:

> "[t]he refuge will streamline the MRA process described above in 2.1.3.1 under Elements Common to All Alternatives, Wilderness Stewardship, by establishing programmatic MRAs for predictable, reoccurring activities, such as water hauling, wildlife surveys, removal of abandoned vehicles…The only case-by-case MRAs anticipated are those covering unpredictable, one time or very intermittent activities requiring generally prohibited uses in wilderness" (pg. 92).

While the streamlining approach may make the planning effort easier for the Service, this is not a legitimate rationale. This approach inappropriately condones decision-making that is blind to the particular, site-specific information upon which "minimum tool" decisions must be made.

In the case of creating "programmatic MRAs," we must send a strong cautionary message to the Service to ensure that this process is only used in instances where the proposed use can be demonstrated as necessary for the administration of wilderness and incurs the *exact* effect *every* time. There are instances when a reoccurring activity may have a wide range of impacts depending on circumstance. For instance, the removal of an abandoned car located near the Camino del Diablo imposes far less of an impact to wilderness than the removal of a car that may be deep within a wilderness area. Therefore, it would be inappropriate to make use of a programmatic MRA for the removal of abandoned vehicles in wilderness because of the varied possible effects and implications of the activity. In sum, the Service must take a hard look at the potential impacts of each activity before using a programmatic MRA.

Conclusion

As managers of refuge wilderness areas, the Service has a legally binding duty to ensure that the wilderness character of designated wilderness is preserved. This duty derives from the Wilderness Act of 1964, as well as the Arizona Desert Wilderness Act from which the Cabeza Prieta National Wildlife Refuge Wilderness was established. The Service must adopt a management plan that protects the unparalleled wilderness values of the Refuge; one way to do this is to bolster patrol at the border and eliminate all vehicular use in designated wilderness areas. The proposals currently in the Service's management plan for Cabeza Prieta are in flagrant disregard of the Wilderness Act and should be amended in a new draft CCP. The Service must update its regulations to make them consistent with the Wilderness Act. Therefore, TWS requests the Service to withdraw its draft CCP and to issue new documents for public comment and review, prior to approving a final CCP.

Thank you for the opportunity to comment on the draft CCP for the Cabeza Prieta National Wildlife Refuge. The wilderness and wildlife values of this refuge are truly outstanding and deserve the most careful and thorough process possible.

Sincerely,

Leslie Catherwood

Leslie Catherwood
Wildlife Refuge Program Associate

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September 21, 2005

Maxwell Reynolds

----- Original Message -----
From: "Max Reynolds" <max473@msn.com>
To: <john_slown@fws.gov>
Sent: Wednesday, August 31, 2005 7:08 AM

- I would like to add my concern to the widening footprint of water trucks in the sierra - I do understand the need for water during tough times on an endangered species ,my point only is that it has been my experience that once ROADS are established no matter where in the world sooner or later wholesale destruction takes place in that pristene land, I would only urge you to keep your footprint as light as possible, if the goal of stopping the program as quickly as possible. don't enjoy writing these e-mails so I hope our views are similar if not I'll write more but not to you sir, but on up the chain as it were I don't want to see another captive breeder program- I'd rather think in terms of populations many thanks
- Max Reynolds

Sept 4-2005
1511 S. 12th Ave
Safford Az 85546
928-428 9568

Dear Mr. Slown,

It was my privelege to tour the Cabeza Prieta with a group of River Protection Activists some years ago ... in vans and with guides from the refuge staff ... an unforgettable experience. It is a rare and precious place and should be protected for its wildlife and habitat. No off road vehicles except staff should be allowed. More human impact (alternative 5) should be avoided. Perhaps guided tours, with reservations, and/or limitations on numbers of people each year would be advisable.

I would support (alternative 4) the development of more waterholes. I couldn't believe the amount of insect and animal traffic at the water hole we observed. These oasis locations should be far away from the casual observer. Antelope especially need distance from human activity ... no helicopters, no catch + release, and NO HUNTING for at least 5 or 10 years. Hunters should support this plan if they believe it will increase the herd for future hunting.

Closer monitoring of pronghorn

well probably mean less pronghorn, and is expensive. Protection is a better solution; without protection there will be no WILD anywhere. No development should be allowed. Money as always is the decision maker. More staff to interact with visitors would be good: videos, talks about desert plants + animals, a movie? guides? etc would be better than pouring money into a new center. If a bigger better visitor center would keep people interested and happy and OUT of the refuge it would say O.K. where will the money come from? Perhaps we need financial support from outside groups: National Wildlife, Sierra Club, or a sponsor like Phelps Dodge who needs to polish its image, that mining company support Az. Opera every year — why not Az. wildlife in Cabeza Prieta?

My experience on 20 acres at the foot of Mt. Graham, with twice a week monitoring of 3 50 gallon water barrels, is that the wildlife wait for me, watch me, and move in the minute I leave. I'm still watching for cougar foot paw prints and hoping to see one (eat that is). Could the citizens of Ajo and Yuma become Cabeza Prieta Partners?

I hope there will be more funding for the dedicated staff, more "hands on" helpers. I am at your service if I can help in any way.

Nancy Klassis

P.S. Could the solar power community be brought in as partners (free equipment, advice etc.) to develop water holes ??!

14 September 2005

Dear Mr. John Slown, US Fish and Wildlife Service

As an Arizonan, we have a unique environment, which is fragile, with many unique species which have learned to survive the harsh and nearly barren desert. This "nearly" barren, by many, is what we have to preserve for future generations, not for just a few years, but to preserve the natural changes that have evolved the flora and fauna into what we enjoy in our Sonora Desert. This nearly barren desert teams with life to keen observers.

We have a terrible problem with our national border with Mexico, with both the illegals and our law enforcement personnel, using the natural wonder as transportation corridors. The solution is not to establish even more roads, in the "roadless" areas, but to solve this illegal immigration problem through economic means, in particular improving the conditions in Mexico and by making enforcing our laws to arrest and deport such illegal people and palatalize their governments.

We shouldn't sacrifice these precious lands to illegal aliens, we must uphold the long-term trust you and your enforcement teams are sworn to protect. Citizens expect our goverment to carry out's it mandates to protect our land but not to protect those from other countries trying to both destroy our lands and enter here illegally. Having seen the photograph at the Cabeza Prieta National Wildlife Refuge Visitor's Center a few months ago, It needs to be seen by all concerned with natural resources on both sides of the border. I was really concerned that too much damage may have already occurred for nature to recover. This failure of the various organizations that have stewardship responsibilities need correction, in particular, by adhering to the principles and mandates of the Wilderness Act, now in its 40th

year. We have both the Sonoran Pronghorn and Desert Big Horn Sheep that need quietness to ensure their species survive, not more 4-WD vehicles running all over the land. The natural plants do not need water-absorbing non-native species that are being introduced from various motor vehicles. The numerous and undocumented Native American artifacts need to not be crushed, stolen or broken and preserved for, as Chief Joseph said, the next seven generations, as we must preserve the lands, myths, and rituals these people used long before the "white" man came.

A few questions:

1. How will these plans ensure these endangered, rare and unique species are maintained and sustained?

2. What is to be done to ensure their natural habitats remain to allow these species to expand into sustainable numbers?

3. Why aren't all the various law enforcement teams and all visitors required to use steam cleaning facilities to cleanse their tire treads before going off road?

4. Why can't all illegal trails be closed ASAP, using large boulders (too big for cars to push aside), to stop cars but let animals still pass) to "seal off" large parts of this wilderness area? This could then funnel illegal traffic to places for law enforcement pickups.

5. Why should off-road vehicles ever be permitted in this NWR? No off-road vehicles (2, 3 or 4 wheel) should be permitted for recreation users, ever! That's a basic tenant for effective stewardship in such an environment.

6. Why don't we have super high fines to violators? Only designated roads should be permitted with no off-road use permitted, with large, say $5,000 fines and loss of vehicle for first offense, without a special use permit. Such permits might be applicable for scientists such as archaeologists, botanist, etc. but not for recreational use, until after all the tracks in that picture at the Visitor's Center have been completely rehabitated.

Could you please provide me copies of these existing draft and final documents on this issue, so I can make more specific comments in the future?

Also, please inform me of any future public hearings on these plans. I don't think any have been held in Santa Cruz County or Tucson to date.

Sincerely,

Marshall Magruder
PO Box 1267
Tubac, AZ 85646
marshall@magruder.org

Appendix D: Response to Public and Agency Comments on the Draft EIS

The federal regulations implementing the National Environmental Policy Act (NEPA) require that agencies preparing Environmental Impact Statements (EIS) respond to all substantive comments received on the draft EIS (40 CFR 1503.4 [b]).As many similar comments were received, this appendix includes a summary statement of each substantive comment, followed by the U.S. Fish and Wildlife Service (Service) response. Many comments were submitted by governmental agencies or nongovernmental organizations; the originator of such comments is credited parenthetically at the end of the comment. Private individuals making comments are not so noted. Where the content of the EIS text has been changed to address the comment, the change is summarized in the appendix. Copies of the full texts of all comments received can be found above at Appendix C.

1. Comment: All of the following should be banned on the refuge: hunting, trapping, any new roads, grazing, mining, drilling, all two-stroke vehicles and prescribed burning.
Response: No trapping, grazing, mineral exploration or mining currently occurs on the refuge or is proposed in any of the alternatives. Prescribed burning may be recommended in the fire plan that is being prepared, but it is unlikely in the desert environment. Vehicles allowed on the refuge non-wilderness roads are limited to those which are registered, street legal and have adequate traction and clearance to pass the poorly maintained roads. There is no restriction on engine type, but the vast majority of vehicles used by refuge visitors have four-stoke engines. Hunting is one of the wildlife dependent priority public uses of the National Wildlife Refuge System. These uses should be provided when they are compatible with the refuge purpose. Desert bighorn sheep hunting will continue on the refuge. Any proposed new hunts will only occur after a determination has been made that they will not adversely affect the refuge Sonoran pronghorn population, that the proposed hunt is compatible with the refuge purpose, and when staff and/or funding are available to administer the hunt.

2. Comment: Page 49, Section 2.1.1.1, Sonoran Pronghorn. The paragraph preceding the inset identifies eight major recovery efforts directed at Sonoran pronghorn recovery. However, the narrative that follows discusses some of the recovery efforts, but not all eight. (Organ Pipe Cactus National Monument, National Park Service)
Response: The section has been edited to include all eight.

3. Comment: Discuss how area closures (during Sonoran pronghorn birthing season) will protect Sonoran Pronghorn from activities associated with illegal migration, drug smuggling, and law enforcement interdiction efforts. During the closure to the public, the areas should also be closed to all agency personnel. (Organ Pipe Cactus National Monument, National Park Service)
Response: An administrative area closure only affects individuals who observe refuge rules. The closure is not anticipated to have any effect on activities associated with illegal migration or drug smuggling. Nor does the closure affect law enforcement, as law enforcement is the only means available to limit the extent of impact upon Sonoran pronghorn and other refuge resources caused by illegal travel through the refuge. The refuge is not closed to agency personnel engaged law enforcement activities or Sonoran pronghorn recovery activities, as such closure would adversely affect the Sonoran pronghorn population.

4. Comment: The EIS should address, under Section 2.1.3.2, Border Law Enforcement, management actions associated with reducing human disturbance of wilderness values from activities associated with illegal border crossings (e.g., illegal migrants, drug smugglers, and law enforcement interdiction efforts). Recommendations include vehicle barriers, coordination/cooperation of the federal agencies to minimize off-road vehicle traffic and

concentrating law enforcement efforts near the border to maximize wilderness preservation and reduce migrant mortalities. (Organ Pipe Cactus National Monument, National Park Service)
Response: Efforts taken by the refuge to limit disturbance of wilderness values related to illegal activities and law enforcement action are described in the EIS text. They include hiring additional refuge law enforcement staff, posting signs on the border describing, in Spanish language text and iconic images, the dangers of crossing the refuge on foot, providing a wilderness orientation video to border patrol agents assigned to the refuge and actively encouraging use of existing non-wilderness corridors for any long-term border law enforcement field stations. The U.S. Department of Homeland Security (DHS) is currently developing plans for a border vehicle barrier. Other solutions, including a human- and vehicle-proof fence along the entire U.S./Mexico border are being considered in Congress. Prior to the DHS's proposal to develop a border vehicle barrier, the refuge had proposed developing a similar structure. Upon review, the Office of Management and Budget determined that the potential cost of a vehicle barrier would be too high to be borne by the National Wildlife Refuge System. The refuge and the Service will participate in all discussions of border structures on or near the refuge. The refuge consistently works with DHS staff and other involved parties, (including Organ Pipe Cactus National Monument) on coordinating border control efforts. The refuge also continues to work with DHS on the planning process for tactical infrastructure on the refuge: the refuge believes acquisition and deployment of force multiplying infrastructure would efficiently identify and direct enforcement personnel to illegal smuggling incursions at or near the border.

5. Comment: In Section 2.5.1.2.3, Population Goal, use the 1995 desert bighorn sheep survey by Henry at Organ Pipe Cactus National Monument (OPCNM) for comparison of an area without developed waters. (Organ Pipe Cactus National Monument, National Park Service)
Response: The Henry study is mentioned document. There are several problems, however with using this survey to compare with refuge desert bighorn sheep surveys. First, the survey gives only a single data point (sheep population at OPCNM in 1995); no trend information is available and desert bighorn sheep populations fluctuate considerably from year to year. Second, OPCNM is more mesic (wetter) overall than the refuge. OPCNM has greater wildlife and plant diversity than the refuge due to this more mesic character. Finally, there are several natural water sources in desert bighorn sheep habitat on OPCNM that permanently or almost permanently hold water.

6. Comment: In Section 2.5.1.2.4, Predator Management, use motion-triggered camera systems to investigate predator use of developed and un-developed waters on the refuge. (Organ Pipe Cactus National Monument, National Park Service)
Response: The refuge currently maintains some motion triggered camera systems at developed waters. Simply photographing predators at water sources, however, provides very little information other than presence at the waters. Rather than additional cameras, the refuge proposes to use predator tracking via GIS equipped radio collars on a sample of predators. Such tracking should provide more information about predator behavior than cameras at waters.

7. Comment: Regarding page 105, Section 2.5.1.3.3, Raptors and Ravens; OPCNM does not have established protocols for inventorying and monitoring raptors and ravens in place. (Organ Pipe Cactus National Monument, National Park Service)
Response: The incorrect information regarding raptor and raven monitoring at OPCNM has been removed from the EIS text.

8. Comment: In Section 2.5.1.3.6, Exotic/Invasive Species; discuss impacts of non-native plant seed dispersal from trespass livestock on the refuge Reiterate restrictions on stock animals, as they can also spread non-native plant seeds. Refuge should remove fountain grass and other exotics by hand and implement vehicle washing requirements for visitors, staff and border law enforcement. (Organ Pipe Cactus National Monument, National Park Service)

Response: The refuge does conduct surveys for invasive species wherever trespass livestock have been documented. Restrictions on diet of pack and saddle stock are included in all special use permits to avoid introduction of weed seeds to refuge. The logistics of adequate monitoring for invasive species on refuge-wide is daunting given existing staff and budgets.

9. Comment: Many comments decried Border Patrol use of vehicles in the Cabeza Prieta Wilderness. (Friends of Cabeza Prieta, Defenders of Wildlife, The Wilderness Society, Maryland Alliance for Greenway Improvement and Conservation, Arizona Native Plant Society)
Response: The Arizona Desert Wilderness Act of 1990, which established the Cabeza Prieta Wilderness, included specific language stating that nothing in the Act would inhibit border law enforcement activities, subject to agreements with the Service. As is described in the EIS, the Service and the refuge work with Border Patrol to emphasize the importance of protecting wilderness resources and character. Border Patrol focuses its routine activities on the non-wilderness corridors and administrative trails in Wilderness, but must sometimes travel cross country to interdict smugglers, or conduct search and rescue operations. Given the resource damage caused by illegal cross country travel by immigrants and smugglers, the Border Patrol presence is a positive influence on refuge resources. The refuge consistently works with staff from DHS and other involved parties on coordinating border control efforts. The refuge also continues to work with DHS on the planning process for tactical infrastructure on the refuge; the refuge believes acquisition and deployment of force multiplying infrastructure would efficiently identify and direct enforcement personnel to illegal smuggling incursions at or near the border, reducing the frequency of off road vehicular travel in wilderness.

10 Comment: "Wildlife functions best in the absence of Man." Hauling water, improving waters, etc. causes problems for native wildlife. Restoring wide open spaces will solve the long term problems facing the Sonoran pronghorn.
Response: Until 2003, very little management activity was occurring throughout the range of the Sonoran pronghorn, and they were nearly extirpated from the US. The drought of 2002 stressed the need to implement numerous recovery actions to ensure pronghorn persist throughout their range in the US. The refuge is not large enough to allow full movement of the Sonoran pronghorn over their historic range. Herds previously ranged much further than the currently accessible range to access water. Developed waters are thus considered to be appropriate.

11. Comment: The number of vehicles per party allowed to the use the Camino del Diablo should be limited to no more than five.
Response: In response to this and other comments, a party size limit of four vehicles or eight individuals has been added to the preferred alternative. Larger parties will require a special use permit.

12. Comment: Scientific support of providing desert bighorn sheep developed water sources is lacking, waters should be removed, or at a minimum no new waters should be developed until research indicates their necessity (many comments cited Bill Broyles article "Desert Wildlife Water Developments: Questions Use in the Southwest," *Wildlife Society Bulletin*, vol.23, Number 4). Hauling water for sheep in wilderness is a violation of the Wilderness Act of 1964. (Friends of the Cabeza Prieta, Sierra Club Rincon Group, The Wilderness Society, The Camp Fire Club of America, Phoenix Zoo, Defenders of Wildlife).
Response: No new waters for desert bighorn sheep are proposed unless data that demonstrate their necessity to conserving sheep is developed. The Broyles article is discussed in the EIS text under the general discussion of uncertainty regarding water developments for sheep. Developed waters have been maintained and supplied in desert bighorn sheep habitat of the refuge for many years. Discontinuing their use is not supported by current science (see expanded discussion in EIS text). Any action associated with either developing new waters (other than those for Sonoran pronghorn recovery, per the Recovery Plan) or eliminating existing water developments will occur

only upon strong evidence indicating the need for such an action. The Service continues to hold that hauling water to supply wildlife waters in wilderness is allowable as the minimum requirement to manage the area as wilderness (see discussion in text and Appendix F).

13. Comment: The refuge should establish a native plant nursery, as proposed in Alternative 2, provided that only seeds from the refuge are used. (Sierra Club Rincon Group)
Response: Establishing a native plant nursery on refuge non-wilderness was eliminated from the proposed alternative due to funding considerations and the difficulty of successfully transplanting specimens into the desert without intensive watering and other post planting treatments.

14. Comment: We support closing 60 miles of administrative trails and testing existing developed waters for pathogens, as proposed in Alternative 2. (Sierra Club Rincon Group)
Response: The administrative closure in the proposed alternative (20 miles) is consistent with access necessary for proposed management actions. Alternative 4 (the proposed alternative) includes annual sampling of developed waters to check for pathogens, although results from several years of testing similar waters at the Kofa National Wildlife Refuge suggest that high pathogen loads are not likely to occur in developed waters.

15. Comment: Refuge law enforcement officers should periodically patrol cultural areas.
Response: Patrols will be included in the next revision of the refuge law enforcement plan. Archaeological Site Stewards, a group of volunteers with archaeological training and state of Arizona recognition, meet with refuge staff and periodically inspect sites.

16. Comment: A long term strategy for managing the Sonoran pronghorn population is needed – captive breeding is not natural and won't sustain the population over the long term. (Sierra Club Rincon Group)
Response: The overall recovery plan for the Sonoran pronghorn is a long term strategy for restoring the species to viability. Operating the semi-captive breeding enclosure is a short-term action responding to the critically low number of animals currently existing in the US. Once the breeding enclosure has met the goals outlined by the recovery team, it will be abandoned.

17 Comment: Expansion of the visitor center is desirable, but should take a lower priority than protecting the refuge's natural resources. Any visitor center expansion should be designed to reduce foot and vehicle traffic on the refuge.
Response: Expanding the visitor center would provide enhanced interpretation of Sonoran Desert resources, and could thus increase interest in, and visitation to, the refuge backcountry. Visitor center programs and materials would orient the visitor to appropriate means of travel and camping in wilderness, thus potentially mitigating visitor damage to refuge resources. Visitor center construction and development would not use refuge habitat program funds.

18. Comment: All existing roads should be closed to the public and vehicle use on the refuge limited to the minimum necessary for law enforcement and management.
Response: The only roads on the refuge open to the public are Charlie Bell Pass Road, el Camino del Diablo and Christmas Pass Road. These roads, all in non-wilderness, support public access for wildlife dependent recreational activities, and will not be closed to the public except for temporary closures to protect refuge resources, such as seasonal closures during Sonoran pronghorn fawning season. All access to the refuge requires obtaining a permit. Management vehicle use in the refuge wilderness is limited to the minimum necessary to administer the refuge.

19. Comment: The Service should allow use of wheeled game carriers in National Wildlife Refuge Wilderness during any hunting season. (Yuma Valley Rod and Gun Club)

Response: Wheeled game carriers meet the definition of "mechanical transport" which is considered a prohibited use in federal wilderness by the Wilderness Act of 1964. We believe the use of wheeled game carriers for hunting purposes is a prohibited activity in wilderness and therefore is not authorized.

20. Comment: The Service has not demonstrated that hunting small game, deer and predators will adversely impact Sonoran pronghorn population stability, therefore these public uses should be allowed, as are all other allowable public uses, except from March 15 to July 15. (Yuma Valley Rod and Gun Club)
Response: The refuge and the Service continue to be extremely concerned about all types of activities that could harass or otherwise harm Sonoran pronghorn. Any such activities will continue to be prohibited until such a time that pronghorn numbers are substantially higher than those currently occurring on the refuge. Additionally, current and near-term projected refuge staffing and operational funding is insufficient to administer additional hunts. Any hunt, other than the current desert bighorn sheep hunt, would require a full compatibility review and publication in the *Federal Register* for public comment.

21. Comment: Vehicles should not be restricted to the middle 100 feet of the 200 foot non-wilderness road corridors. The entire 200 foot width should be available. (Yuma Valley Rod and Gun Club)
Response: Normal driving is intended to occur only within the actual roadway within the non-wilderness corridors, as off-road driving is generally prohibited on National Wildlife Refuges (50CFR27.31). The 100 –foot provision is to allow pulling off the roadway to park. Limiting access to one-half of the non-wilderness corridor reflects the refuge's concern with protecting fragile desert soils from unnecessary disturbance by vehicles.

22. Comment: The programs proposed under Alternative 5 for Wilderness Recreation and Camping should be in the preferred alternative. (Yuma Valley Rod and Gun Club)
Response: The Proposed Alternative's Wilderness Recreation and Camping programs have been revised to more closely resemble those of draft Alternative 5. Fires will remain permitted only with wood hauled in from off refuge at the vehicle camping sites. Backcountry wilderness campers will be allowed to make campfires using dead and down local wood.

23. Comment: Extreme alternatives (very little active management or public use or very much of each) should not be included in the final EIS.
Response: NEPA requires that an EIS examine the full range of reasonable alternatives, including those which a reasonable person might propose, but which the managing agency would be very unlikely to implement. The range of alternatives analyzed in the draft EIS will remain in the final EIS.

24. Comment: The US Air Force, Marines, the Department of Homeland Security, the Bureau of Land Management and Arizona Game and Fish Department should all be participants in the planning process.
Response: All of these agencies were consulted by the Service during plan preparation and review.

25. Comment: Visitor access permitting should be streamlined so that the refuge has primary responsibility for issuing permits. The process would include a one to five year general access permit and hold harmless agreement, as well as an individual trip permit with information about the proposed route of travel, length of stay, etc. Permits would include a personal permit and a vehicle permit, color coded by year.
Response: The airspace over the refuge continues to be managed by the military. Although refuge closures by the military have been extremely infrequent in the last decade, there may be

instances when the refuge will need to be closed due to Department of Defense (DOD) missions. Furthermore, unexploded ordnance from past military live-firing activity may remain on the refuge, and DOD is potentially liable for any damages resulting from contact with such ordnance. In view of these factors, the refuge will continue to provide permits that are valid for the Barry M. Goldwater Range, Cabeza Prieta and the Sonoran Desert Monument. Such permits are a DOD requirement; the refuge issues them as a convenience for visitors.

26. Comment: Pack and saddle stock, ATVs, dune buggies and sand rails should be prohibited from recreation use to limit environmental damage.
Response: Pack and saddle stock are allowed on the refuge only through a Special Use Permit, which allows refuge monitoring and control of impacts from their use. Pack and saddle stock facilitate some recreational uses in the wilderness area of the refuge, and are generally considered to be appropriate uses in federal wilderness. Prohibiting any street-legal, registered vehicle capable of transiting refuge roads from the refuge is legally problematic. Assuming that a visitor will break the law (by operating a vehicle off-road) simply because he or she has the ability to do so is unwarranted.

27. Comment: Restocking the refuge with desert bighorn sheep from off-site to meet numerical goals, per Alternative 5, is ill advised and contrary to preserving ecological integrity.
Response: As is reflected in the impact analysis section of the EIS, the Service agrees with this comment, but has evaluated the practice as one that has been proposed and should be considered within the realm of reasonable management.

28. Comment: Plan must look forward to day when the border problems have subsided and Arizona population reaches 15,000,000. At this point recreation pressures on the refuge could be much greater than any seen to date, and access quotas might be necessary [this and at least one other commenter believed that the planning time-frame to be 25, rather than 15, years]. (Friends of Cabeza Prieta)
Response: Management actions on the refuge would change if impacts from recreation increase to the point that natural resource damage is occurring throughout the refuge from recreational use. Current projections do not support such an increase during the 15-year life of this plan. Should such an increase occur, the CCP would be amended to address the new condition.

29. Comment: FWS should be addressing not only recovery of the Sonoran pronghorn, but also recovery of refuge from degradation by human activity. The refuge should immediately launch a reclamation study with sample plots and techniques to identify practical measures for reclamation. FWS must include an actual plan and budget for recovery of damage and impacts to ecological, aesthetic, historical cultural, economic, or social values of the refuge whether direct or indirect, singular or cumulative. (Friends of Cabeza Prieta)
Response: Impacts from human activity are recorded yearly. Given the amount of illegal activity currently occurring, it would be inefficient and ineffective to implement any recovery measures until illegal cross border travel and smuggling decreases. Once the permanent vehicle barrier begins to stem the tide of illegal entry (primarily vehicles), the refuge can begin implementing reclamation activities. Furthermore, much of the damage will be difficult to repair. Miles of roads created by smugglers occur throughout the wilderness area; efforts to repair the entire extent of the damage are impractical. Data collected in recent years will be used to guide restoration efforts when and where they are feasible.

30. Comment: More detail and effort is needed on history/cultural resources. Cultural sites should be surveyed and trails mapped. The plan should endorse writing and publishing the refuge administrative history in book form.
Response: The Service agrees that such information and survey is desirable, but completing the surveys would require hiring and supporting an archaeologist or other cultural resources

specialist. Given current priorities and funding levels, this is not feasible. Cultural resources are mapped and documented as they are encountered. Archaeological Site Stewards, a non-profit group of qualified volunteer archaeologists, periodically conducts surveys of the refuge believed to contain historical or archaeological resources. Prior to any projects requiring moving of earth, a cultural resources review occurs. Any historical or archaeological resources discovered on the refuge are protected by avoidance during refuge management operations.

31. Comment: Toxic organisms becoming established in developed wildlife waters present a threat to the refuge wildlife populations.
Response: Very little data support this claim. Studies by the Navy at the Barry M. Goldwater Range and by the Service at Kofa National Wildlife Refuge found no such organisms present in developed wildlife waters.

32. Comment: The vegetative carrying capacity of the refuge should be determined and included in the plan.
Response: The refuge's carrying capacity is a very complex concept. There are capacities for different combinations of wildlife populations, and carrying capacity changes considerably from year to year with variation in rainfall amount and pattern. Determining a carrying capacity for the refuge would be very complex and labor intensive and might not produce information useful to managers.

33. Comment: The plan focuses narrowly on two species, desert bighorn sheep and Sonoran pronghorn. More information is needed to on the ecosystem effects of managing theses two species.
Response: The Service recognizes the strong focus on two species. The refuge is mandated to implement activities consistent with the purposes for which it was established. Additionally the refuge occupies the bulk of the US range of the Sonoran pronghorn, an endangered species at proximate risk of extirpation. Given these considerations, the CCP does focus on desert bighorn sheep and Sonoran pronghorn.

34. Comment: The refuge should look beyond its borders to the regional ecosystem.
Response: The refuge recognizes the importance of working in the regional ecosystem. The refuge regularly coordinates with its neighbors to address ecosystem issues beyond its borders.

35. Comment: Refuge staff should be expanded to double or triple its current size.
Response: Additional staff would be beneficial in accomplishing refuge goals and managing the many refuge programs, but large staff increases are unlikely to be funded during the 15-year planning timeframe.

36 Comment: Improved waters that do not go dry or require hauling would be a good thing, but commenter is skeptical of such "perpetual motion machines." (Friends of the Cabeza Prieta)

Response: While the proposed improved waters might occasionally require maintenance to repair damage, the principle of collecting and storing water from high runoff events in high volume tanks has precedents in the similar environments. The Antelope tank, which was upgraded over two and one half years ago, has not yet required any supplemental water or repairs.

37. Comment: A 24-hour safety hotline should be established to allow refuge visitors to obtain help in emergencies. (Friends of the Cabeza Prieta)
Response: There are logistical problems with this idea. Much of refuge is beyond coverage of cellular telephones. The refuge does not have adequate staff to cover a 24-hour hotline. Visitors to wilderness areas nationwide assume some risk by traveling and camping in remote, primitive areas.

38. Comment: Bill refuge rules violators for the actual cost of restoring the damage they cause.

Response: A national fine structure for violations of refuge rules already exists (50 CFR 28.32). A judge, however, could assess additional fines related to the cost of restoration. The Service has not typically petitioned the courts in cases of violations, but could do so in the case of unusually egregious violations.

39. Comment: Consider converting the refuge into a National Park, possibly in combination with other federal lands in regions. (Friends of Cabeza Prieta)
Response: This action is beyond the scope of the Service, and would require an act of the US Congress.

40. Comment: Look at metapopulations, find ways for bighorn populations east of Highway 85 or south of Mexican Highway 2 to occasionally mingle. (Friends of Cabeza Prieta)
Response: The Service supports development of travel of corridors for wildlife use. As the science of wildlife movement corridors expands, the refuge will work its neighbors to establish travel corridors for all wildlife, not just bighorn sheep.

41. Comment: Do not redevelop the Copper Canyon driving loop.
Response: The proposal to reopen this existing road loop would require only modest redevelopment. The road would be open only to vehicles capable of traversing rough terrain and would not be maintained to high standard. Reopening this route is consistent with providing opportunities for wildlife observation and photography. The time of reopening the Copper Canyon Loop road, however, would be uncertain due to potential conflicts with Sonoran pronghorn use of the Childs Valley and a need to coordinate its opening with the Bureau of Land Management.

42. Comment: "FWS has two great desert refuges in this region. The Kofa already is heavily managed (many waterholes, frequent wildlife translocations, general hunting) and its wilderness crossed by cherry-stemmed roads. In contrast with the Kofa, we believe that this region needs the second refuge to be lightly managed, to let nature run things, to serve as a reservoir of baseline desert biology and study. This should be the Cabeza." (Friends of the Cabeza)
Response: The Service is managing the Cabeza Prieta National Wildlife Refuge as lightly as is feasible, in the context of the refuge purpose, the Service mission and the Endangered Species Act.

43. Comment: MOU and interagency agreements need to be updated to ensure they meet the current needs of the refuge with respect to increased border traffic.
Response: A national MOU between DHS, the Department of the Interior and the Department of Agriculture has recently been signed (See Appendix B, above). The refuge now plans on developing a local MOU with respect to border law enforcement.

44. Comment: Monitoring in a constant and systematic way is essential to make adaptive management possible.
Response: The refuge monitoring programs (described in Sections 3 and 2.2 of the EIS) reflect a commitment to as much systematic monitoring as is feasible given existing and projected levels of staffing and necessary investment of staff resources in border law enforcement activities.

45. Comment: FWS needs to support strongest protection of wilderness, with a hands-off management style. (Friends of Cabeza Prieta, The Wilderness Society)

Response: That is what the refuge does, within the constraints of supporting the refuge purposes and compliance with the National Wildlife Refuge System Improvement and Endangered Species Acts.

46. Comment: Consider wildlife habitat connectivity for Sonoran pronghorn (and other species) across Interstate Highway 8 and Arizona Highway 85.
Response: See response to comment number 40, above.

47. Comment: Allow MOU with FAA and USAF to expire and remove communications equipment. (Grand Canyon Chapter Sierra Club, Maryland Alliance for Greenway Improvement and Conservation, Defenders of Wildlife)
Response: The decision to renew the MOUs for equipment on Childs Mountain will be considered at the time of its expiration in 2018. Much of the existing equipment on the mountain supports law enforcement and public and employee safety, this equipment will remain. The decision will be made by the Service Southwest Regional Director, with input from the refuge.

48. Comment: To comply with Section 110 of the National Historic Preservation Act, the refuge must provide for identification and protection of its historic properties. The refuge should hire an archaeologist.
Response: The Service Southwest Regional Office employs a Cultural Resources/Historic Preservation Officer. This individual ensures that all refuges in the region comply with Section 110 of the National Historic Preservation Act and other relevant cultural and historic legislation. The Cultural Resources/Historic Preservation Officer is consulted on all refuge projects to assure compliance with all relevant legislation and regulations.

49. Comment: Expand the Visitor Center and staff it seven days a week.
Response: The Proposed Alternative calls for expanding the Visitor Center. The level of funding available to the refuge, however, prohibits keeping the Visitor Center open seven days a week. Visitation to the Ajo area in general, and refuge in particular, during the summer is low and there is little reason to open the Visitor Center during weekends.

50. Comment: Rather than limiting refuge use of administrative trails and closing some, consider abandoning them altogether and abiding by the Arizona Desert Wilderness Act of 1990.
Response: The Arizona Desert Wilderness Act of 1990 contains provisions for the continued operations of border law enforcement entities. It would thus be problematic to abandon all administrative trails. Additionally, if the minimum tool necessary to complete wilderness dependent projects requires use of mechanical transport, these administrative trails should be used minimize damage to wilderness character.

51. Comment: Historic wells on the refuge could be redeveloped for wildlife.
Response: Many of the existing wells in the non-wilderness portion of the refuge have been redeveloped for Sonoran pronghorn or desert bighorn sheep. There is no effort to develop waters to benefit wildlife in general.

52. Comment: Wilderness restrictions on FWS staff access impede inventory and management of resources (Arizona Desert Bighorn Sheep Society)
Response: Wilderness restrictions do not impede inventory and management of resources. Funding availability to staff positions are more of an impediment.

53. Comment: A requirement should be added to reevaluate use of developed waters of Sonoran pronghorn once recovery goals have been met. (Arizona Wilderness Coalition)
Response: Results from providing water during the extreme drought of 2002 illustrated the importance of providing water for Sonoran pronghorn. As droughts occur periodically, it will be necessary to have developed waters available during these dry times. Artificial structures such as fences and highways, as well as agricultural lands, limit the Sonoran pronghorn population's ability to range freely in search of water and forage.

54. Comment: None of the five alternatives protects the wilderness resources of the refuge. The driving allowed disturbs wildlife and causes other irreversible damage to wilderness. (The Wilderness Society, Defenders of Wildlife)

Response: All five of the proposed alternatives would require a minimum requirements analysis prior to implementing any activity identified as incompatible with the Wilderness Act of 1964. Thus the minimum requirements analysis would be the mechanism to ensure wilderness resources are protected on the refuge. Furthermore, all management actions occurring within the wilderness are taken to protect and benefit the wilderness resource.

55. Comment: Regarding border law enforcement: "It is inappropriate, and probably illegal, to open vast sections of the refuge's wilderness to unlimited vehicular use and road building. The draft CCP acknowledges the damage from this use in the refuge, but goes on to say that the border issue is 'outside the scope of this CCP.' If the most damaging activity in the refuge falls outside a Comprehensive Conservation Plan's scope, what could possibly fall within it?" (language from The Wilderness Society form letter, many copies received)

Response: The tone and contents of this comment are misleading. The statement that border issues are outside the scope of the CCP does not indicate that the Service and the refuge are taking no action to address border issues, it is a statement of the fact that magnitude of the border smuggling and illegal traffic issues is beyond the refuge's ability to control, and that agencies undertaking border law enforcement are outside of the Service's or the refuge's control. The Arizona Desert Wilderness Act of 1990, which established the refuge wilderness, specifically exempts border law enforcement:

> LAW ENFORCEMENT BORDER ACTIVITIES – Nothing in this title [Title 3 of the act, which designates wilderness on Service lands], including the designation as wilderness of lands within the Cabeza Prieta National Wildlife Refuge, shall be construed as –
>
> (1) precluding or otherwise affecting continued border operations by the Immigration and Naturalization Service, the Drug Enforcement Administration, or the United States Customs Service within such refuge, in accordance with any applicable interagency agreements in effect on the date of enactment of this Act; or
>
> (2) precluding the Attorney General of the United State or the Secretary of the Treasury from entering into new or renewed agreements with the Secretary [of the Interior] concerning Immigration and Naturalization Service, Drug Enforcement Administration, or United States Customs Service border operations within such refuge, consistent with management of the refuge for the purpose for which such refuge was established, and in accordance with laws applicable to the National Wildlife Refuge System (Title 3, Sec. 301 (g)).

Given this language in the wilderness designating legislation, border law enforcement will occur within the refuge wilderness and would continue under any management alternative implemented by the refuge.

It is also important to note, however, that neither the Service nor the refuge has opened any of refuge's wilderness to unlimited vehicular or road building by border law enforcement. The refuge and the Service, in fact, work closely with border law enforcement agencies to assure that they use non-wilderness access roads and existing administrative trails for routine patrols. When off-road or trail driving is necessary for apprehension or rescue operations, DHS bureaus notify the refuge of the extent and location of such driving. The large number of roads recently developed in wilderness has been established by undocumented immigrants and smugglers driving illegally. The refuge provides wilderness training to Border Patrol agents assigned to work within its boundaries. As is described in the EIS, the refuge has added law enforcement positions to work with Border Patrol and is doing what it can to address this large issue. The ultimate solution of the border problem, however, lies at a level far above that of the Fish and Wildlife Service.

56. Comment: If natural water can support any population of desert bighorn sheep, that population should the plan's target, not some unnaturally high number.
Response: As discussed in the CCP, it is the professional judgment of refuge management and biologists that currently available studies and data do not support removing developed wildlife waters and depending solely on natural precipitation and water in vegetation to support the refuge desert bighorn sheep population. The population goal of the proposed alternative is not unnaturally high, but represents the upper end of natural population fluctuation observed on the refuge. Managing for the high numbers of this species is consistent with the refuge purpose.

57. Comment: "Off road vehicles and exotic plants are somewhat synonymous, the former providing the disturbance for the invasion of the latter."
Response: The refuge agrees and is concerned about the relatedness of the two impacts. Surveys for exotic plants continue on the refuge and they are removed by hand when encountered as staff and funding allow.

58. Comment: Research how motorized travel corridors, both inside and outside the wilderness, affect the natural hydrologic cycles (sheet flow).
Response: This is an area of interest to the refuge, and research into the effects of motorized travel corridors is identified as a priority in the proposed alternative, however existing and projected funding levels restrict the level of research that is feasible.

59. Comment: Hiking trails should not divert visitors into cultural resource areas.
Response: There are no designated hiking trails on the refuge, and there no plans to develop hiking trails.

60. Comment: The refuge should work with Mexico to limit the spread of exotic plants.
Response: The refuge coordinates with Mexico to some degree on limiting spread of exotic plants. Resources to address the spread of exotics are limited on both sides of the border, but the refuge will continue to address the control of invasive species, in the US and Mexico, as staff and funding allow.

61. Comment: Place wildlife conservation first, above wilderness preservation. Do not close any administrative trails. (Arizona Desert Bighorn Sheep Society)
Response: Wilderness designation adds another refuge purpose, that of protecting wilderness character. This purpose is neither of lower priority than the wildlife purpose of the refuge nor are the purposes conflicting. The wilderness considerations simply affect the methods of wildlife management used. Closing administrative trails no longer used for wildlife management activities to refuge management use is consistent with the Wilderness Act of 1964's prohibition of permanent roads. Closing administrative trails to border law enforcement use, however, is beyond the authority of the Service or refuge.

62. Comment: Convince Border Patrol to limit its activities to the border (including a structural vehicle barrier), Interstate 8 and State Highway 85 – leave the refuge alone.
Response: The Department of Homeland Security is engaged in planning for a vehicle barrier and service road to be developed primarily within the 60-foot easement along the border. This is anticipated to result in major decreases of illegal vehicle travel on the refuge, but will not prevent pedestrians from crossing the border illegally. Border Patrol (as well as other entities engaged in border law enforcement) has a responsibility to implement U.S. laws by apprehending illegal border crossers. The refuge also continues to work with DHS on the planning process for tactical infrastructure on the refuge; the refuge believes acquisition and deployment of force multiplying infrastructure would efficiently identify and direct enforcement personnel to illegal smuggling incursions at or near the border, reducing the frequency of off road vehicular travel in wilderness.

63. Comment: Hunting in wilderness is appropriate, but should be limited to bow and arrow.
Response No provisions within the Wilderness Act of 1964 or its regulations prohibit the use of firearms for hunting in Wilderness.

64. Comment: Encourage camping in arroyos. One good rain cleans them out.
Response: The Leave No Trace materials given to visitors will include a discussion of the benefits of camping arroyos.

65. Comment: Develop more campsites, really just mark areas suitable for camping along the Camino. This will limit off-road driving by new comers looking for a place to camp.
Response: Given current and project levels of visitation, the existing campsites along the Camino should generally be sufficient. There is no evidence that visitors are driving off-road seeking camp sites. Should visitation levels increase sharply, the refuge may designate additional camping areas along the Camino.

66. Comment: Remove all fencing.
Response: The refuge has removed internal fencing and fencing between the refuge and OPCNM. Where trespass cattle continue to be problematic refuge boundary fencing will be maintained. Restrictions on some BLM grazing lessees require the use of fencing that can be laid down or otherwise removed when sites are not being grazed.

67. Comment: Provide surface water catchments for all native wildlife. Close and obliterate all roads not needed to service these catchments.
Response: Providing water for wildlife in desert wilderness is not consistent with the Service's mandate. The water developments on the refuge are all aimed at either Sonoran Pronghorn recovery or maintenance of an acceptable density of desert bighorn sheep. Under the proposed alternative, administrative trails not needed to service developed wildlife waters are closed to refuge management use. The refuge cannot close designated administrative trails used by border law enforcement agents.

68. Comment: The refuge has authority to drive on administrative trails whenever necessary to implement wildlife management, per the legislative intent of the Arizona Desert Wilderness Act of 1990. (Arizona Desert Bighorn Sheep Society)
Response: The Service's reading of the Arizona Desert Wilderness Act indicates that a minimum requirements analysis is necessary prior to any use of mechanized or motorized transport in the refuge wilderness. The refuge will continue to execute case-by-case minimum requirements analysis for water hauling, abandoned vehicle removal or other use of vehicles in the refuge wilderness.

69. Comment: Please reaffirm the commenter's understanding that there is a prioritization of authority: the National Wildlife Refuge System Improvement Act of 1997 supercedes the Endangered Species Act of 1973, which then supercedes the Wilderness Act of 1964. (Arizona Desert Bighorn Sheep Society)
Response: As indicated above in response to Comment 59, there is no inherent hierarchy among these laws. Each applies; the refuge must manage wildlife compliant with all three.

70. Comment: The No Action Alternative is different than management activities directed by the last enacted management plan. (Arizona Desert Bighorn Sheep Society).
Response: Many conditions on the refuge have changed in ways not anticipated since the last management plan was enacted. These include the great increase of illegal cross border travel occurring, the drastic decrease in Sonoran pronghorn seen in 2002, and an increase in fires. Ongoing refuge management has responded to these changes. The No Action Alternative is aimed at describing the management of the refuge as it would continue without implementation of any of

the action alternatives. This would be continuation of management that occurs now on the refuge, not a return to some past management regime.

71. Comment: There appears to be some internal inconsistency regarding the refuge wilderness boundary.
Response: The wilderness boundary depicted in the EIS reflects the official Service survey and legal description.

72. Comment: Desert bighorn sheep goal of 500 to 700 animals in proposed alternative appears low in that it is based on lower than average sheep density when compared to other nearby ranges. (Arizona Desert Bighorn Sheep Society)
Response: There is much controversy regarding the proper refuge desert bighorn sheep population goal. Other comments have called the proposed goal unnaturally high. The proposed goal is one that refuge and Arizona Game and Fish Department biologists support as a realistic goal for the refuge.

73. Comment: Educate all visitors about their potential of introducing non-native seeds via their clothing, camping equipment, pack/saddle stock, and/or vehicles.
Response: Handouts provided to all refuge visitors will include this information.

74. Comment: Overflights are disruptive to wildlife and visitors, and should be restricted or eliminated.
Response: Airspace over the refuge is not managed by the Department of the Interior, but the Department of Defense; military overflights cannot be eliminated or restricted by the refuge or the Service. The refuge does work with the Department of Defense to develop guidelines for sensitive areas. A study by Krausman et al (cited in the EIS) found little impact to wildlife from military overflights. Disruption to visitors is outlined in the hold harmless agreement signed by all permitted refuge visitors.

75. Comment: Increasing the number of law enforcement patrols by FWS staff would demonstrate to the public that refuge resources are important. The patrols would also yield a greater knowledge of the refuge.
Response: Refuge law enforcement staff and activity have grown since 2002 and are anticipated to continue to grow over the next year, however, necessary administrative support and adequate levels of law enforcement are limited by available funding.

76. Comment: The refuge should develop a comprehensive list of invasive species occurring on the refuge and then prioritize for removal and continual continuous control of those most aggressively invasive.
Response: The refuge has list of invasive species and is engaged in control actions. Fountain grass has been almost entirely eradicated from the refuge. Isolated patches of buffelgrass are removed when encountered.

77. Comment: While management of illegal cross-border traffic has been correctly identified as outside the scope of the CCP, the refuge should continue to cooperate with border law enforcement and plan for a time when the border issues have been resolved.
Response: The refuge actively cooperates with border law enforcement, both through consultation with law enforcement agencies and through participation of refuge officers in border law enforcement operations. The management actions proposed in the CCP anticipate a return to normal refuge operations at some point in the future when illegal border activity decreases.

78. Comment: The Service should continue to maintain and develop wildlife waters for Sonoran pronghorn as a component of their recovery, and should work with the U.S. Air Force and Bureau

of Land Management to have additional waters developed on their lands outside of wilderness. When the species is recovered, the Service should investigate removing the developed wildlife waters. (Arizona Wilderness Coalition)
Response: Past experience with the dynamics of the U.S. population of Sonoran pronghorn indicates that even when numbers are high, a severe drought can decimate the population and supplemental water may be necessary. Developed wildlife waters in Sonoran pronghorn habitat will not be removed unless the action is supported by the Sonoran pronghorn recovery team. As stated elsewhere in this appendix, developed waters compensate for the Sonoran pronghorn population's loss of ability to range over an extensive area search of water and forage.

79. Comment: The Service should support continuous, long-term research into the relationship between desert bighorn sheep and developed waters. The ongoing University of Arizona study should not be viewed as the ultimate resolution of questions, but just one piece in an ongoing process of learning Sonoran Desert wildlife behavior. (Defenders of Wildlife, Arizona Wilderness Coalition, The Wilderness Society)
Response: The Service recognizes the need for additional research on wildlife use of developed waters and the long-term effects of such use on populations of multiple species. The refuge welcomes third-party research on this topic, and will continue to study the question as funding permits.

80. Comment: If findings that developed waters benefit sheep would result in new waters being proposed, then findings that developed waters do not benefit sheep should result in the refuge considering removal of waters. (Arizona Wilderness Coalition)
Response: The EIS has been edited to reflect this.

81. Comment: Explain why sheep numbers on the refuge have consistently declined since 1993.
Response: While the trend in refuge desert bighorn sheep population was a decline between 1993 and 2002, a slight rise was documented between the 2002 and 2005 surveys. The factors affecting the refuge desert bighorn sheep population are only poorly understood. Refuge operating budgets have allowed sheep surveys to occur only every three years, even given the Arizona Game and Fish Department's assistance in conducting surveys. More frequent surveys would provide more accurate information about declines or increases in the refuge desert bighorn sheep population.

82. Comment: The Service should aggressively pursue opportunities for the military assistance in abandoned vehicle removal using helicopters.
Response: When asked about the possibility of assisting the refuge by removing abandoned vehicles using heavy-lift helicopters, the Arizona National Guard was initially interested in the activity as a training opportunity. Upon examination of the practicalities; however, military officials were reluctant to take on the risks involved due to the complexities of vehicle removal. These include the likelihood that vehicles may be shielded by trees, as many travel in riparian areas; uncertainty regarding center of balance; and other variables. The refuge will continue to investigate the possibility of partnering with the military to extract vehicles.

83. Comment: The preferred alternative should include some limit of acceptable degradation of wilderness, beyond which action to prevent further degradation will occur.
Response: Early drafts of the EIS included the use of limits of acceptable change in wilderness, but these were removed during internal review due to a concern that no level of wilderness degradation is allowed in the Wilderness Act of 1964. The refuge will continue to monitor wilderness sample plots, as described in the EIS, and document any degradation detected.

84. Comment: Long term climate change could have a devastating effect on refuge and wildlife. The Service should continue to study the ultimate effects of climate change and should continue to provide supplemental water to refuge wildlife until the issue is understood.
Response: Affects from long term climate change on the refuge are difficult to anticipate and could certainly have major impacts on refuge habitat and wildlife. The refuge will continue to monitor meteorological data gathered for the refuge region and wildlife response.

85. Comment: Desert bighorn sheep should not be hunted while the population is in decline.
Response: While the recent population trend documented for desert bighorn sheep on the refuge does show a decline, it is not believed to be a serious decline. Removing 5 to 8 animals per year from the population is minimal, and should not have an overall negative impact on the refuge sheep population. Furthermore, only older males are harvested; the loss of surplus males has no real effect on the refuge bighorn sheep population.

86. Comment: Coyote control should be reconsidered. Coyote are native, watchable wildlife.
Response: Predator control will only be implemented in areas where documented impacts to Sonoran pronghorn are occurring (e.g., the breeding enclosure or important fawning areas).

87. Comment: "The CCP at times reads like a fantasy novel: contemplating public use camping programs in the midst of a war zone. Throughout the CCP, the FWS proposes public use programs and management activities as if the border issues had disappeared, when in fact the chances of the border issues to quell in the next fifteen years, the planning horizon of the CCP, are virtually nil. Perhaps the most telling example in the CCP states: 'The program of inspecting clothing and vehicles for seeds, while appropriate, would probably have little impact compared with the volume of non-native plants introduced to the refuge by illegal entrants to the refuge'". (Defenders of Wildlife)
Response: The refuge has a responsibility to plan for those activities it can manage. Despite the high levels of illegal activity occurring on the border, visitors continue to come to the refuge, and programs for visitor orientation must be in place. Wildlife management actions must also continue. Furthermore, it is not possible for the refuge to project whether the trend of increasing illegal activity at the border will continue or reverse due to forces occurring outside the refuge.

88. Comment: The refuge does not propose enough action to address the border issue. (Defenders of Wildlife, the Wilderness Society).
Response: Issues associated with the border go beyond the scope of the Service's responsibilities or ability to act. The Service is not charged with enforcing federal immigration and customs regulations. Furthermore, the dynamic nature of border issues prevents the Service from identifying all possible strategies that will be necessary to ultimately deter smugglers and illegal migrants from entering the United States through Cabeza Prieta National Wildlife Refuge. The refuge will continue to support the border patrol, provide them what tools the refuge can offer and provide refuge law enforcement officers to work alongside border patrol agents. Border related issues will occur irrespective of the refuge management alternative chosen. The refuge will continue to work with DHS staff and other involved parties on coordinating border control efforts The refuge will also continue to work with DHS on the planning process for tactical infrastructure on the refuge; the refuge believes acquisition and deployment of force multiplying infrastructure would efficiently identify and direct enforcement personnel to illegal smuggling incursions at or near the border, thereby minimizing impacts from border issues.

89. Comment: The CCP is deficient in both its cumulative effects analysis and in its identification of alternatives to address border law enforcement and illegal entry. NEPA demands that cumulative effects analysis be both detailed and quantified. Neither the number of acres affected by illegal immigration nor the take of Sonoran pronghorn is estimated for the alternatives in a quantitative manner. "It is not enough simply to state that border activities cause 'significant,

cumulative effects'. The FWS must analyze what those effects are. Importantly, the CCP fails to analyze the cumulative effects of not just border activities, but every activity within the planning area on Sonoran pronghorn. What are the cumulative and synergistic effects of thousands of people crossing the border on foot, scores of illegal vehicles driving off road, hundreds of on and off road vehicle trips made by law enforcement personnel, low level law enforcement helicopter flights, low level military helicopter flights, agency vehicle trips in Sonoran pronghorn habitat to haul water maintain artificial waters, recreational hunting, camping, hiking, and pack animal use, the spread of exotic species by many of the above activities, and the increasing threat of fire due to the invasion of exotic species?" (Defenders of Wildlife)

Response: The EIS does quantify acreage of area disturbed by illegal road and trail development. Determining a numerical "take" on the Sonoran pronghorn population caused by any one of the factors related to illegal border related activity, military operations, refuge management and other variable such as drought would be purely speculative. Many of the criticisms provided above are unquantifiable; the movement of people and drugs through the refuge corresponded with the period during which the refuge lost all radio collared pronghorn. Additionally, the take of Sonoran pronghorn related to border issues is more appropriately dealt with in consultation between the Department of Homeland Security and the Service Ecological Services Division than the refuge. The Service has attempted to quantify effects of all activities on the refuge where possible. Projecting future effects of illegal border activities is further clouded by uncertainty. Enforcement agencies are outside of the Service's control, and are responding rapidly to an emergency situation. Furthermore, any actions proposed by agencies involved with border enforcement will need to examine these impacts in the context of direct impacts and cumulative impacts. The Service cannot be held accountable to examine potential impacts from unknown projects. The Service will continue to work with agencies proposing actions on the refuge to minimize direct, indirect and cumulative effects on Sonoran pronghorn and all other resources managed by the refuge. The Service has analyzed the cumulative effects of activities within the planning area on pronghorn. There are no biological opinions involving actions affecting pronghorn habitat that authorize take of Sonoran pronghorn. The refuge's proposed alternative, as well as the other alternatives, includes no actions that would result in such take. Therefore, statements suggesting the Service has not examined cumulative effects on pronghorn are incorrect.

90. Comment: The National Wildlife Refuge System Improvement Act and Refuge Planning Policy require the Service to identify and describe problems which may adversely affect the populations and habitats of fish, wildlife and plants within the planning unit and the actions necessary to correct or mitigate such problems. The CCP fails to include actions necessary to correct the border situation. (Defenders of Wildlife)

Response: While the Service is cooperating with Department of Homeland Security bureaus addressing the situation and has added refuge law enforcement staff with experience in border law enforcement, it is unrealistic to expect that the refuge or the Service has the ability to propose, let alone implement, "actions necessary to correct the border situation." Individual actions aimed at protecting certain refuge resources such as the Sonoran pronghorn semi-captive breeding facility, are described in the EIS, but these actions are limited in scope and effect as compared to the overall border situation. The refuge consistently works with staff form DHS and other involved parties on coordinating border control efforts. The refuge also continues to work with DHS on the planning process for tactical infrastructure on the refuge; the refuge believes acquisition and deployment of force multiplying infrastructure would efficiently identify and direct enforcement personnel to illegal smuggling incursions at or near the border.

91. Comment: Proposed testing of developed waters for pathogens should include trapping and sampling of disease vectors, particularly biting midges and other insects.

Response: The refuge agrees with this assessment, and will conduct the testing as funding and staffing allow.

92. Comment: Sonoran pronghorn should be translocated to unoccupied existing habitat (e.g., east of State Highway 85 and on or near Kofa National Wildlife Refuge.
Response: The recovery plan for Sonoran pronghorn identifies creating an additional, discrete population of Sonoran pronghorn in the United States. This recovery action will be implemented when the recovery team determines that sufficient population exists to support translocation of individuals.

93. Comment: Restrictions on pack animals, while appropriate, are entirely unenforceable.
Response: The refuge and the Service disagree. If the holder of a special use permit for pack and/or saddle stock does not comply with the conditions of the permit, the refuge can fine and /or remove the violator from the refuge.

94. Comment: Copper Canyon road loop should not be developed. Beyond the importance to Childs Valley to Sonoran pronghorn, the Service should not be n the business of creating new roads in refuges, whether wilderness or not. Road development is incompatible with the Refuge System's wildlife first mandate.
Response: Road development is not incompatible with the wildlife first mandate if the road supports or facilitates a wildlife dependent public use. Opening the Copper Canyon road loop would not include creation of any new roads; rather it would be reopening an existing road that is occasionally still used by refuge personnel. The proposal to redevelop the Copper Canyon Loop Road is likely to be delayed due to concerns about impacts to sensitive wildlife populations, coordination with the Bureau of Land Management (BLM), which manages adjacent land crossed by the loop road.

95. Comment: Designation of Wilderness adds another, equal purpose to management of federal lands, protection of wilderness values. Management to achieve other purposes must be compliant with wilderness protection. (Defenders of Wildlife, the Wilderness Society)
Response: Management actions in refuge wilderness are compliant with the Wilderness Act of 1964 as minimum requirements to administer the area as wilderness.

96. Comment: The CCP incorrectly assumes that the only question relevant to hauling water to developed wildlife waters in wilderness desert bighorn sheep habitat is how it affects desert bighorn sheep. The refuge must be concerned with the well being of the entire desert ecosystem and the wilderness character of the refuge, not just the sheep.
Response: The CCP does consider ecosystem health and wilderness character, but the refuge also has a responsibility to conserve desert bighorn sheep populations. Protecting desert bighorn sheep was a major consideration in refuge establishment. It is important to remember that the federally designated wilderness adds a supplemental wilderness stewardship purpose to the refuge, but does not remove the refuge's other purposes. As is discussed in the EIS, provision of developed waters is the subject of considerable controversy, with some research suggesting that a large group of native wildlife species benefits from developed waters, while other research finds that developed waters have a negative effect on desert ecological communities.

97. Comment: "In the case of creating 'programmatic MRAs,' we must send a strong cautionary message to the Serviced to ensure that this process is only used in instances where the proposed use can be demonstrated as necessary for the administration of wilderness and incurs the *exact* effect *every* time. There are instances when a reoccurring activity may have a wide range of impact depending on circumstance. For instance, the removal of an abandoned car located near the Camino de Diablo imposes far less of an impact to wilderness than the removal of a car that may be deep within a wilderness area. Therefore, it would be inappropriate to make use of a programmatic MRA for the removal of abandoned vehicles in wilderness because of the varied possible effects and implications of the activity. In sum, the Service must take a hard look at the potential impacts of each activity before using a programmatic MRA." (The Wilderness Society)

Response: The Service and refuge, upon reflection, agree with the above comment. While programmatic minimum requirements determinations are still included to cover each general type of management action, an individual analysis will be made prior to each specific vehicle trip or other mechanized transport/motorized use of wilderness proposed. These individual analyses will consider site specific and activity specific variables.

Appendix E: Plant Species Present at Cabeza Prieta National Wildlife Refuge

The following list includes 391 species verified to occur on the refuge. The plants are listed alphabetically by family, genus, species, subspecies or variety. Common names appear first. Non-native plants are indicated with an asterisk [*]. This information was compiled by Richard Felger[1].

FERNS AND FERN ALLIES

MARSILEACEAE -- Pepperwort family
- Hairy water-clover *Marsilea vestita*

PTERIDACEAE -- Brake Family
- Scaly star fern *Astrolepis cochisensis cochisensis*
- Parry's lip fern *Cheilanthes parryi*
- Indian fern or California cloak fern *Notholaena Californica californica*
- Star cloak fern *Nothlaena standelyi*

SELAGINELLACEAE – Spikemoss family
- Arizona spike-moss *Selaginella arizonica*
- Desert spike-moss *Selaginella eremophila*

SEED PLANTS

ACANTHACEAE -- Acanthus Family
- Lemilla *Carlowrightia arizonica*
- Desert hummingbird-bush *Justicia californica*

AGAVACEAE -- Century Plant Family
- Desert agave *Agave deserti simplex*

AIZOACEAE -- Aizoon Family
- Slender-leaf iceplant *Mesembryanthemum fimbriatus*

AMARANTHACEAE -- Amaranth Family
- Fringed pigweed *Amaranthus fimbriatus*
- Careless weed, or pigweed, A*maranthus palmeri*
- Honeysweet *Tidestromia lanuginose*

ANACARDIACEAE -- Sumac Family
- Desert sumac *Rhus kearneyi keraneyi*

APIACEAE (UMBELLIFEREAE) -- Carrot Family
- Hairy bowlesia *Bowlesia incana*
- Wild carrot *Daucus pusillus*
- *Eryngium nasturtiifolium*
- Scale seed *Spermolepis echinata*

ARISTOLOCHIACEAE -- Birthwort Family
- Indian-Root *Aristolochia watsonii*

ASCLEPIADCEAE -- Milkweed Family
- White-stem milkweed *Asclepias albicans*
- Giant sand-milkweed *Asclepias erosa*
- Angle pod *Matelea parvifolia*
- Climbing milkweed *Sarcostemma cynanchoides hartwegii*

ASTERACEAE (COMPOSITAE) -- Daisy Family
- Brownfoot *Acourtia wrightii*

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[1] Felger, Richard S. 1998, *Checklist of the Plants of Cabeza Prieta National Wildlife Refuge, Arizona.* Drylands Institute: Tucson.

Adenophyllum porophylloides
Canyon ragweed *Ambrosia ambrosioides*
Slim-leaf ragweed *Ambrosia confertiflora*
Triangle-leaf bursage *Ambrosia delotidea*
White bursage *Ambrosia dumosa*
Holly-leaved burshage *Ambrosia ilicifolia*
Baccharis brachyphylla
Seep willow *Baccharis salicifolia*
Desert broom *Baccharis sarothroides*
Many-flowered desert-marigold *Baileya multiradiata*
Woolly desert-marigold *Baileya pleniradiata*
Sweet-bush *Bebbia juncea* var. *aspera*
Brickellia atractyloides var. *atractyloides*
Brickell-bush *Brickellia coulteria* var. *coulteria*
White tackstem *Calycoseris wrightii*
* Yellow star-thistle *Centaurea melitensis*
Pebble pincushion *Chaenactis carphoclinia*
Desert pincushion *Chenactis stevioides* var. *stevioides*
*Horseweed *Conyza canadensis* var. *glabrata*
**Conyza coulteri*
Brittlebush *Encelia farinosa* var.*farinose*
Brown-center brittlebush *Encelia Farinosa* var. *phenicodonta*
Rayless encelia *Encelia frutescens* var. *frutescens*
Desert fleabane *Erigeron lobatus*
Woolly daisy *Eriophyllum lanosum*
Arizona fluffweed *Filago arizonica*
California fluffweed *Filago californica*
Arizona blanket-flower *Gaillardia arizonica*
Desert sunflower *Geraea canescens*
Gutierrezia arizonica, Xanthocephalum arizonicum
Broom snakeweed *Gutierrezia sarothrae*
Gumhead *Gymnosperma glutinosum*
Dune sunflower *Helianthus niveus*
Slender burro-bush *Hymenoclea monogyra*
White burro-bush *Hymenoclea salsola* var. *pentalepis*
Hymenothrix wislizenii
Bitterweed *Hymenoxys odorata*
Alkali goldenbush *Isocoma acradenia* var. *acradenia*
*Prickly lettuce, or compass plant, *Lactuca seriola*
Goldenweed *Machaeranthera coulteri* var. *arida*
Spiny goldenweed *Machaeranthera pinnatifida* var.*gooddingii*
Desert dandelion *Malacothrix fendleri*
Smooth desert dandelion *Malacothrix glabrata*
*Pineapple weed, or false chamomile, *Matricaria matricarioides*
Mojave Desert star *Monoptilon bellioides*
Spanish needles *Palafoxia arida* var. *arida*I
Desert chinchweed *Pectis papposa* var. *papposa*
Desert rock daisy *Perityle emoryi*
Desert fir, or pygmy cedar *Peucephyllum schottii*
Arrow-leaf *Pleuocoronis pluriseta*
Odora *Porophyllum gracile*
Prenanthella exigua
Desert velvet *Psathyrotes ramosissima*

Paper daisy *Psilostrohe cooperi*
California chicory *Rafinesquia californica*
Desert chicory *Rafinesquia neomexicana*
Lemmon groundsel *Senecio lemmonii*
Mojave groundsel *Senecio mohavensis*
*Spiny sow-thistle *Sonchus asper asper*
Desert straw *Stephanomeria pauchifloraI* var.*pauchiflora*
Schott's wire-lettuce *Stephanomeria schottii*
Desert nest-straw *Stylocline micropoides*
Coyote manzanilla *Thymophylla concinna*
Thymophylla pentachaeta
Yellow head *Trchoptilium incisum*
Trixis californica var. *californica*
Silver puffs *Uropappus lindleyi*
Parish goldeneye *Viguiera parishii*

BIGNONIACEAE -- Bignoia Family
Desert willow *Chilopsis linearis arcuata*

BORAGINACEAE -- Borage Family
Devil's lettuce, or fiddleneck, *Amsinckia intermedia* var. *echinata*
Checker fiddleneck *Amsinckia tessellata*
Desert cryptantha *Cryptantha angustifolia*
Bearded crypthantha *Cryptantha barbigera*
Dune cryptantha *Cryptantha ganderi*
Winged cryptantha *Cryptantha holoptera*
White-haired cryptantha *Cryptantha maritima* var. *maritima*
White-haired cryptantha *Cryptanta maritama* var. *Pilosa*
Dwarf cryptantha *Cryptantha Micrantha micrantha*
Wing-nut Cryptantha *Cryptantha pterocarya* var. *cycloptera*
Alkali heliotrope *Heliotropium curassavicum*
Stickseed *Lappula redowskii*
Mixed-nut comb-bur *Pectocarya heterocarpa*
Broad-wing comb-bur *Pectocarya platycarpa*
Tiquilia canescens
Palmer crinklemat *Tiquilia palmeri*

BRASSICACEAE (CRUCIFERAE) -- Mustard Family
*Sahara mustard *Brassica tournefortii*
Caulanthus lasiophyllus var. *lasiophyllus*
Tansy mustard *Descurainia pinnata*
Dune spectacle-pod *Dimorphocarpa pinnatifida*
Spectacle-pod *Dithyrea californica*
Wedge-leaf draba *Draba cuneifolia* var *integrifolia*
Sand peppergrass *Lepidium lasiocarpum*
Delicate bladderpod *Lesquerella tenella*
Lyrocarpa coulteri var. *coulteri*
London rocket *Sisymbrium irio*
Long-beaked twist-flower *Streptanthella longirostris*
Lacepod *Thysanocarpus curvipes*

FURSERACEAE -- Frankincense Family
Elephant tree *Bursera microphylla*

CACTACEAE -- Cactus Family
Saguaro *Carnegiea gigantean*
Many-headed barrel cactus *Echinocactuspolycephalus* var. *polycehalus*
Hedgehod cactus *Echiocereus engelmanii* var. *chrysocentrus*

Golden hedgehog cactus *Echinocereus nicholii*
Moutain barrel cactus *Ferocactus cylindraceus*
Barrel cactus *Ferocactus emoryi*
Barrel cactus *Ferocactus wislizeni*
Senita *Lophocereus schottii* var. *schottii*
Fishook cactus *Mammillaria grahamii*
Corkseed fishhook cactus *Mammillaria tetrancistra*
Buckhorn cholla *Opunita acanthocarpa*
Beavertail cactus *Opuntia basilaris* var. *basilaris*
Teddybear cholla *Opuntia bigelovii*
Pancake prickly-pear *Opuntia cholorotica*
Silver cholla *Opuntia echinocarpa*
Desert prickly-pear *Opuntia engelmannii* var. *engelmannii*
Yellow –spine desert prickly-pear *Opuntia engelmannii* var. *engelmannii*
Jumping cholla *Opuntia fulgida* var. *fulgida*
Desert club cholla *Opuntia kunzei*
Desert Christmas-cholla *Opuntia leptocaulis*
Diamond cholla *Opuntia ramosissima*
Cane cholla *Opuntia spinosior*
Desert night-blooming cereus *Peniocereus greggii* var. *transmountanis*
Organpipe *Stenocereus thurberi*

CAMPANULACEAE -- Bellflower Family
Threadstem *Nemacladus glanduliferus* var. *orientalis*

CAPPARACEAE -- Caper Family
Jackass clover *Wislizenia refracta refracta*

CARYOPHYLLACEAE --- Pink Family
Sand mat, or frost mat *Achyronychia cooperi*
Drymaria viscose
Sleepy catchfly *Silene antirrhina*

CHENOPODIACEAE -- Goosefoot Family
Four-wing saltbush *Atriplex canescens*
Wheel-scale orach *Atriplex elegans elegans*
Wheel-scale orach *Atriplex elegans fasciculate*
Narrow-leaf saltbush *Atriplex linearis*
Pacific orach *Atriplex pacifica*
Desert saltbush *Atriplex polycarpa*
*Net-leaf goosefoot *Chenopodium murale*
Poverty weed *Momolepis nuttalliana*
*Russian thistle, or tumbleweed, *Salsola tragus*
Desert seepweed *Suaeda moquinii*

CONVOLVULACEAE -- Morning Glory Family
Morning glory *Ipomoea hederacea*

CRASSULACEAE -- Stonecrop Family
Crassula connata
Arizona liveforever *Dudleya arizonica*

CROSSOSOMATACEAE -- Crossosoma Family
Ragged rock-flower *Crossosoma bigelovii*

CUCURBITACEAE -- Gourd Family
Desert starvine *Brandegea bigelovii*
Coyote gourd *Cucurbita digitata*

CUSCUTACEAEA -- Dodder Family
Dodder *Cuscuta umbellate*

CYPERACEAE -- Sedge Family

Yellow nutgrass *Cyperusu esculentus* var. *esculentus*
Dwarf sedge *Cyperus squarrosus*
EPHEDRACEAE -- Ephedra Family
Mormon tea *Ephedra aspera*
EUPHORBIACEAE -- Spurge Family
Copperleaf *Acalypha californica*
Sonora croton *Croton sonorae*
Dune croton *Croton wigginsii*
Sonoran silverbush *Ditaxis brandegeei* var. *intonsa*
Narrowleaf sliverbush *Ditaxis lanecolata*
Ditaxis serrata var.*serrata*
Golondrina *Euphorbia abramsiana*
Rattlesnake weed *Euphorbia albomarginata*
Euphorbia florida
Euphorbia eriantha
Hyssop spurge *Euphorbia hyssopifolia*
Golondrina *Euphorbia micromera*
Louse spurge *Euphorbia pediculifera* var. *pediculifera*
Golondrina *Euphorbia petrina*
Desert spurge *Euphorbia polycarpa*
Fringed spurge *Euphorbia setiloba*
Euphorbia spathulata
Euphorbia trachysperma
Limberbush *Jatropha cuneata*
Arizona jumping bean *Sebastiania bilocularis*
Stillingia linearifolia
FABACEAE (LEGUMINOSAE) -- Legume Family
White-thorn *Acacia constricta*
Catclaw *Acacia greggii*
Sand locoweed *Astragalus insularis* var. *harwoodii*
Small-flowered milk-vetch *Astragalus nuttallianus* var. *imperfectus*
Hog potato *Caesalpinia glauca*
Fairy duster *Calliandra eriophylla*
Blue palo verde *Cercidium microphyllum*
Silky Dalea *Dalea mollis*
Desert rock-pea *Lotus rigidus*
LotusSalsuginosus var *brevivillus*
Hairy lotus *Lotus strigosus*
Arizona lupine *Lupinus arizonicus*
Elegant lupine *Lupinus concinnus*
Mohave lupine *Lupinus sparsiflorus*
Marina parryi
Ironwood *Olneya tesota*
Desert bean *Phaseolus filiformis*
Western honey mesquite *Prosopis glandulosa* var.t*orreyana*
Velvet mesquite *Prosopis velutina*
Emory indigo-bush *Psorothamnus emoryi* var. *emoryi*
Smoke tree *Psorothamnus spinosus*
Hojasen *Senna covesii*
FOUQUIERIACEAE -- Ocotillo Family
Ocotillo *Fouquieria splendens splendens*

GERANIACEAE -- Geranium Family
*Filaree, or storksbill, *Erodium cicutarium*
False filaree, or desert storksbill, *Erodium texanum*
HYDROPHYLLACEAE -- Waterleaf Family
Eucrypta chrysanthemifolia var. *bipinnatifida*
Peluda *Eucrypta micrantha*
Purple matseed *Nama demissum*
Bristly nama *Nama hispidum*
Desert heliotrope *Phacelia ambigua*
Fern-leaf phacelia *Phacelia distans*
Phacelia neglecta
Pholistoma auritum var. *arizonicum*
KRAMERICACEAE -- Ratany Family
Range ratany *Krameria erecta*
White ratany *Krameria grayi*
LAMIACEAE (LABIATAE) -- Mint Family
False pennyroyal *Hedeoma nanum* var. *macrocalyx*
Desert lavender *Hyptis emoryi*
Bladder sage *Salazaria mexicana*
Desert chia *Salvia columbariae*
Teucrium cubesne depressum
Teucrium glandulosum
LILIACEAE -- Lily Family
Wild onion *Allium macropetalum*
Ajo-lily, or desert-lily, *Hesperocallis undulata*
Blue sand-lily *Triteleiopsis palmeri*
LOASACEAE -- Stick-leaf Family
Velcro plant *Eucnide rupestris*
Triangle-seed blazing-star *Mentzelia affinis*
White-stem blazing-star *Mentzelia involucrate* var. *megacantha*
Blazing –star *Mentzelia multiflora*
Mentzelia oreophila
Sandpaper plant *Petalonyx thurberi*
MALPIGHIACEAE -- Malpighia Family
Fermina *Janusia gracilis*
MALVACEAE -- Mallow Family
Abutilon incanum
Abutilon malacum
Abutilon palmeri
Eremalche exilis
Bladder mallow *Herissantia crispa*
Desert rose-mallow *Hibiscus coulteri*
Rock hibiscus *Hibiscus denudatus var. denudatus*
Pink velvet-mallow *Horsfordia alata*
Orange velvet-mallow *Horsfordia newberryi*
Malvella leprosa
Mavella sagittifolia
Desert globe mallow *Sphaeralcea ambigua ambigua*
Annual globe mallow *Sphaeralcea coulteri* var. *coulteri*
Mal de ojo *Sphaeralcea* emory
Orcutt globe mallow *Sphaeralcea orcuttii*
MARTYNIACEAE -- Devil's Claw Family
Devil's claw *Proboscidea altheaefolia*

MOLLUGINACEAE -- Carpetweed Family
Glinus lotoides
NOLINACEAE -- Beargrass Family
Desert tree-beargrass *Nolina bigelovii*
NYCTAGINACEAE -- Four-O'clock Family
Sand verbena *Abronia villosa* var. *villosa*
Angel's trumpets *Acleisanthes longiflora*
Trailing windmills *Allionia incarnata*
*Scarlet spiderling *Boerhavia diffusa*
Spiderling *Boerhavia erecta* var. *erecta*
Spiderling *Boerhavia erecta* var *intermedia*
Spiderling *Boerhavia spicata*
Spiderling *Boerhavia wrightii*
Desert four-o'clock *Mirabilis bigelovii* var. *bigelovii*
OLEACEAE -- Olive Family
Twinberry *Menodora scabra*
ONAGRACEAE -- Evening Primrose Family
Camissonia arenaria
Woody bottle-washer *Camissonia boothii condensate*
Camissonia californica
Willow-herb evening primrose *Camissonia chamaenerioides*
Camissonia claviformis peeblesii
Camissonia claviformis rebescens
Lizard- tail or velvet-leaf gaura *Gaura parviflora*
Oenothera deltoids deltoids
Dune primrose, or white desert primrose, *Oenothera deltoids deltoides*
Yellow desert primrose *Oenothera primiveris primiveris*
OROBANCHACEAE -- Broomrape Family
Desert broomrake *Orobanche cooperi*
PAPAVERACEAE -- Poppy Family
Prickly poppy *Argemone gracilenta*
Little gold poppy *Eschscholzia minutiflora*
PLANTAGINACEAE -- Plantain Family
Woolly plantain, or Indian wheat, *Plantago ovata*
Pastora *Plantago patagonica*
POACEAE (GRAMINEAE) -- Grass Family
Six –week three-awn *Aristida adscensionis*
California three-awn *Aristida californica* var. *californica*
Parish three-awn *Aristida parishii*
Purple three-awn *Aristida ternipes* var. *nealleyi*
Poverty three-awn *Aristida ternipes* var. *gentiles*
Spidergrass *Aristida ternipes* var. *ternipes*
Cane bluestem *Bothriochola barbinodisI*
Six-week needle grama *Bouteloua aristidoides*
Six-week grama *Bouteloua barbata*
Red grama *Bouteloua trifida*
Piojillo de Arizona *Brachiaria arizonica*
California brome *Bromus carinatuus*
*Foxtail, or red brome, *Bromus rubens*
*Field sandbur *Cenchrus incertus*
*Feather fingergrass *Chloris virgata*
*Bermuda grass *Cynodon dactylon* var. *dactylon*
Cottontop *Digitaria californica*

*Junglegrass, junglerice or leopard grass, *Echinochola colonum* var. *colonum*
*Barnyard grass *Echinochloa crusgralli var.crusgallil*
Spike pappusgrass *Enneapogon desvauxii*
*Stinking lovegrass *Eragrostis cilianensis*
*Lehmann lovegrass *Eragrostis lehmanniana*
Bearded cupgrass *Eriochloa aristata* var. *aristata*
Fluff-grass *Erioneuron pulchellum*
Tanglehead *Heteropogon contortus*
*Wild barley *Hordeum murinum glaucum*
Rep sprangletop *Leptochloa mucronata*
Sticky sprangletop *Leptochloa viscida*
Littleseed muhly *Muhlenbergia microsperma*
Bush muhly *Muhlenbergia porteri*
Panicum alatum var. *alatum*
Mexican panicgrass *Panicum hirticaule* var. *hirticaule*
*Buffelgrass *Pennisetum ciliare*
*Fountain grass *Pennisetum setaceum*
*Little-seed canary grass *Phalaris minor*
Big galleta *Pleuraphis rigida*
Bigelow bluegrass *Poa bigelovii*
**Schismus arabicus*
*Mediterranean grass *Schismus barbatus*
White-haired bristlegrass *Setaria leucopila*
*Johnson grass *Sorghum halepense*
Alkali sacaton *Sporobolus airoides*
Sand dropseed *Sporobolus cryptandrus*
Slim tridens *Triens muticus* var. *muticus*
Sixweeks fescue, or eight-flowered fescue, *Vulpia octoflora*

POLEMONIACEAE -- Phlox Family
Eriastrum diffusum
Broad-leaf gilia *Gilia latifolia*
Star gilia *Gilia stellata*
Langloisia setosissima setosissima
Linanthus bigelovii

POLYGONACEAE -- Buckwheat Family
Brittle spine flower, or short-horn spine-flower, *Chorizanthe brevicornu brevicornu*
Wrinkled spine-flower *Chorizanthe corrugata*
Rigid spine-flower *Chorizanthe rigida*
Skeleton weed *Eriogonum deflexum*
Flat-top buckwheat *Eriogonum faciculatum* var. *polifolium*
Desert trumpet, or bladder stem, *Eriogonum inflatum*
Eriogonum thomasii
Eriogonum thurberi
Little trumpet *Eriogonum trichopes* var. *trichopes*
Eriogonum wrightii var.*pringlei*
Woolly heads *Nemacaulis denudata* var. *gracilis*
*Silversheath *Polygonum argyocoleon*

PORTULACACEAE -- Portulaca Family
Portulaca halimoides

RANUNCULACEAE -- Ranunculus Family
Texas virgin bower *Clematis drummondii*
Barestem larkspur *Delphinium scaposum*

RESEDACEAE -- Mignonette Family
Desert cambess *Oligomeris linifolia*
RHAMNACEAE -- Buckthorn Family
Crucillo *Condalia globosa* var. *pubescens*
Graythorn *Ziziphus obtusifolia* var. *canescens*
RUBIACEAE -- Madder Family
Starry bedstraw *Galium stellatum* var. *eremicum*
RUTACEAE -- Rue of Citrus Family
Turpentine broom *Thamnosma Montana*
SCROPHULARIACEAE -- Snapdragon Family
Desert snapdragon *Antirrhinum cyathiferum*
Snapdragon vine *Maurandya antirrhiniflora*
Mojave beard tongue *Penstemon pseudo spectabilis* var. *pseudospectabilis*
Purslane speedwell, or necklace-weed, *Veronica peregina xalapensis*
SIMAROUBACEAE -- Quassia Family
Crucifixion thorn *Castela emoryi*
SOLANACEAE -- Nightshade Family
False nightshade *Chamaesaracha coronpous*
Poisonous nightshade *Datura discolor*
Desert wolfberry *Lycium andersonii* var. *andersonii*
Fremont wolfberry *Lycium fremontii* var. *fremontii*
Lycium macrodon var. *macrodon*
Parish wolfberry *Lycium parishii* var. *parishii*
Desert tobacco *Nicotiana clevelandii*
Coyote tobacco, or desert tobacco, *Nicotiana obtusifolia*
Desert ground cherry *Physalis crassifolia*
Physalis lobata
STERCULIACEAE – Cacao Family
Ayenia filiformis
TAMARICACAEAE – Tamarisk Family
*Salt-cedar, or tamarisk, *Tamarix ramosissima*
TYPHACEAE – Cattail Family
Southern cattail *Typha domingensis*
ULMACEAE – Elm Family
Desert hackberry *Celtis pallida pallida*
URTICACEAE – Nettle Family
Desert pellitory *Parietaria floridana*
VERBENACEAE – Verbena Family
Oreganillo *Aloysia wrightii*
Tetraclea coulteri
Verbena bracteata
Verbena gooddingii
Verbena officinalis halei
VISCACEAE – Mistletoe Family
Desert mistletoe *Phoradendron californicum*
ZYGOPHYLLACEAE – Caltrop Family
Fagonia californica laevis
Fagonia californica longipes
Fagonia pachyacantha
California caltrop *Kallstroemia californica*
Orange caltrop *Kallstroemia grandiflora*
Creosote bush *Larrea divaricata tridentate*
*Puncture vine, or goathead, *Tribulus terrestris*

Appendix F: Minimum Requirements Analyses for Refuge Management Actions in Cabeza Prieta National Wildlife Refuge Designated Wilderness

All management actions proposed to occur within designated wilderness on the refuge are subject to minimum requirements analysis (MRA). This is a two-step analysis of each action's appropriateness. The first step evaluates the proposed action's necessity to continued administration of the area as wilderness. The second step investigates and compares the impacts to wilderness resources that would result from various alternative methods of implementing the proposed management action. The first step verifies that a proposed action meets the stipulation of Section 4 (c) of the Wilderness Act that permitted uses are necessary to administer the area as wilderness. The second step verifies that the proposed action is the minimum required to meet the need for management intervention in wilderness.

The overall environmental analysis presented in the EIS and the selection of Alternative 4 as the proposed alternative indicates that Alternative 4 is the required minimum action necessary to achieve the wilderness goals of refuge management. This is analogous to the first step of the MRA, as described above. Each step of the MRA is detailed for the generic actions described below to provide the reader an understanding the rationale that was used to determine appropriate actions in wilderness.

An MRA for each of the generic management actions proposed under Alternative 4 (the proposed alternative) follows. When actual management activity in wilderness is scheduled to occur, a site specific MRA for that action, considering site conditions, season, recent weather and other variables specific to that action will be prepared to supplement the generic MRA for the class management activity. The basic format for the MRAs follows the procedure of the Minimum Requirement Decision Guide, published by the Arthur Carhart National Wilderness Training Center in April 2002. The decision process is presented in narrative form summarized from the worksheets presented in Minimum Requirement Decision Guide.

In every alternative described below that will require refuge staff or volunteers to camp in wilderness while accomplishing a management action, the persons will be advised to observe leave-no-trace camping practices.

Action 1: Radio collar Sonoran pronghorns

The refuge is the center of U.S. range of the Sonoran pronghorn, an endangered species. The species' recovery plan calls for use of a population monitoring protocol that includes maintaining operable radio collars on 10 per cent of the U.S. population. Radio collared individuals are essential to accurately determining the population levels of this rare, wide-ranging animal. Refuge and AGFD staffs conduct collaring operations from helicopters, using net guns to capture animals and then landing the helicopter nearby to fit the animal with a radio collar and take biological measurements of the collared animal. This action thus involves landing of aircraft in designated wilderness.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**. "Emergency" in this context means an immediate threat to human health or safety.
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** Discussion: some occupied Sonoran pronghorn range lies within non-wilderness lands of the refuge or administered by the Bureau of Land Management and Department of Defense. While it would be feasible to conduct all radio collar operations in these areas, such selection of animals occurring only in non-wilderness would result in a non-representative sample of the population being collared, because only the small subset of the population occurring in that limited range would be sampled. This skewing of the sample could result in drawing inaccurate conclusions regarding the status of the overall population, and is thus inappropriate.
4. Is there a special provision in legislation that allows this project activity? **No**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Yes. Why/how?** Between the fall of 2002 and the winter of 2005, no active collars remained on any Sonoran pronghorns in the U.S. population. During that period the Service experienced extreme difficulty in determining the population's size and movements. The failure to maintain such population data adversely affects the recovery efforts for this animal and could contribute to its extirpation or extinction. Loss of this animal, in addition to being contrary to the Endangered Species Act, would reduce wilderness naturalness, as the Sonoran pronghorn is a component of the Sonoran Desert in its natural state.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **Yes. Why/How?** – Some visitors to the refuge are interested in viewing the Sonoran pronghorn. To the extent that poor understanding of the size and structure of the population resulting from a failure to collar animals contributes to their decline, it would adversely affect these recreationists.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No.** This effort is focused on the recovery of single species, the Sonoran pronghorn.

5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a critically endangered wilderness species.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** Obtaining accurate information on the size and movements of the U.S. subpopulation of Sonoran pronghorn is critical to the sub-species' recovery. For reasons stated above, it necessary to collar animals in wilderness to obtain these data.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (four of six questions above answered "yes") it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

The refuge and AGFD staff will capture and collar Sonoran pronghorn using net guns fired from helicopters and then land the helicopters to provide access to the captured animals for radio collaring.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No** (other than landing helicopters)
Landing of airplanes?	**No**
Landing of helicopters?	**Yes**
Use of mechanical transport?	**No** (other than landing helicopters)
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**Yes** (some animals will be collared)

Describe the biophysical effects/benefits of this alternative: implementing this alternative would result in maintaining functioning radio collars on 10 percent of the U.S. sup-population of Sonoran pronghorn. This is a requirement of the species' recovery plan and will allow accurate tracking of the sub-population's size and movement. In the past some mortality to animals has occurred during or subsequent to capture and collar operations. Protocols now in place should greatly reduce the incidence of mortality.

Describe the societal/political effects/benefits: Some stakeholders oppose collaring animals in wilderness as inconsistent with the natural and untrammeled character of wilderness. Visitors observing a capture operation would likely feel that their wilderness experience was compromised.

Describe health and safety and concerns/benefits: While there is some possibility of a helicopter crash or other accident, the safety plan in place for capture and collar operations should address health and safety concerns.

Describe economic and timing considerations/benefits: Maintaining radio collars on ten percent of the population of Sonoran pronghorn will improve the efficiency of species recovery efforts.

Describe heritage resource considerations/benefits: None

Selected alternative is Alternative 1. The use of helicopters and their landing in wilderness is the only method to accomplish radio collaring of Sonoran pronghorn, a necessary recovery activity. Alternatives methods such as attracting the animals into an enclosure for collaring through use of food bait, or darting the animals to immobilize them have proven unworkable.

Action 2: Sonoran pronghorn population monitoring

The refuge is the center of U.S. range of the Sonoran pronghorn, an endangered species. The species' recovery plan calls for estimating the population level. The refuge and AGFD staff cooperatively monitors the species using aircraft. A full population survey of the refuge is conducted every year in December. AGFD conducts less detailed flights weekly to ascertain, using both radio telemetry and visual observations, how the population is moving and identify any large changes in population numbers.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **Yes Why/How?** AGFD aircraft are used in the airspace over the wilderness, but do no land in wilderness.
1. Is there a special provision in legislation that allows this project activity? **No**

As the activity can be undertaken entirely outside of wilderness, using aircraft in the airspace over the wilderness. No further analysis is necessary.

Action 3: Accessing Wilderness to conduct necropsy of Sonoran pronghorn

When dead Sonoran pronghorn are identified, either by direct observation during weekly telemetry flights, or by receipt of a "mortality" signal from a radio collar in the case of a collared individual, a refuge and/or AGFD biologist is deployed to the locate the carcass and conduct a field necropsy and general investigation to determine the cause of death. The biologist also collects tissue samples and takes measurements to ascertain the animal's condition at the time of death. This information is important to understanding mortality factors for this endangered species.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1 Is this an emergency? **No.**
2 Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3 Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** Discussion: when a Sonoran pronghorn dies in wilderness, the field necropsy and other field investigations must occur in wilderness.
4 Is there a special provision in legislation that allows this project activity? **No**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Yes. Why/how?** Timely necropsies of Sonoran pronghorn mortalities yield valuable data regarding stresses on the U.S. sup-population of Sonoran pronghorn. Understanding the factors affecting mortality in this endangered species should allow development of increasingly effective means of managing the species in wilderness.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **Yes Why/How?** Wildlife observation is a type of unconfined recreation and is a priority public use of National Wildlife Refuges. The loss of a large mammal from the refuge/ecosystem would be an important loss to the public.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No.** The action would the benefit management of the Sonoran pronghorn, a single species.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a critically endangered wilderness species. If this wilderness species were to become extinct, the wilderness resource would be altered for future generations.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** The animals must be recovered from the place of mortality. Collecting data from only those individuals that die in non-wilderness would be more convenient and less costly for the refuge, but would not implement the species' recovery plan.

Step 1 conclusion: Administering the activity in non-wilderness areas only is not feasible as the location of the activity is dependent on the location of Sonoran pronghorn mortalities. The activity will protect some wilderness values (four of six questions above answered "yes"). It is, thus appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge and/or AGFD will access identified Sonoran mortalities by driving a refuge or AGFD vehicle to the nearest non-wilderness point and then walking to the site of mortality, conducting the necropsy and walking back to the vehicle.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative could result in refuge and/or AGFD staff hiking up to approximately 23 kilometers (14.3 miles) from their vehicles to reach the site of mortality. This would delay the necropsy investigations by up to 3 hours over the maximum hiking time of Alternative 2 below. Any delay in reaching the mortality site increases the likelihood that the scavenging and other decomposition will reduce the potential for effective necropsy.

Describe the social recreational benefits: Visitors are not disturbed by the motor vehicles used within wilderness in other alternatives.

Describe the societal/political effects/benefits: None

Describe health and safety concerns/benefits: the long hikes potentially required by this alternative could be hazardous to health and safety of staff conducting the investigations, particularly during the heat of summer, when much Sonoran pronghorn mortality occurs.

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Alternative 2

Refuge and/or AGFD will access identified Sonoran mortalities by driving a refuge or AGFD vehicle to the nearest point on a refuge Administrative Trail or non-wilderness access road and then walking to the site of mortality, conducting the necropsy and walking back to the vehicle. The maximum one-way distance from a vehicle to a potential mortality location would be approximately 8 kilometers (5.6 miles) Staff would only use administrative trails when the site of mortality is greater than 5 kilometers (3.1 miles) from the non-wilderness access road.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative could result in refuge and/or AGFD staff hiking up to approximately 8 kilometers (5.6 miles) to reach sites of necropsy. This savings in distance hiked, and therefore time, could result in collecting superior information about Sonoran pronghorn mortality

Describe the social recreational effects/benefits: This alternative would slightly increase the number of vehicle trips on Administrative Trails in wilderness. This would negatively impact the wilderness recreational experience of any visitors who encounter a vehicle in wilderness. The likelihood of this impact occurring, however, is low, as the greatest mortality to Sonoran pronghorn occurs during the heat of summer when visitation is very low.

Describe the societal/political effects/benefits: None

Describe health and safety concerns/benefits: the reduced length of hiking required by this alternative would place less stress on the health and safety of staff conducting the investigations, particularly during the heat of summer, when much Sonoran pronghorn mortality occurs.

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Alternative 3

Refuge and/or AGFD will access identified Sonoran mortalities by driving a refuge or AGFD vehicle with horse trailer to the nearest non-wilderness point, riding to the site of mortality, conducting the necropsy and riding back to the vehicle.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative should result in time savings in accessing Sonoran pronghorn mortalities in wilderness. This should result in collection of more accurate data on the causes of death and animal condition at death This benefit would be negated, however, if difficulty in traversing refuge roads while towing a trailer (see below) results in unreliable access for necropsies.

Describe health and safety concerns/benefits: implementing this alternative would greatly reduce the amount of hiking required of refuge/AGFD staff conducting necropsy investigations. This would benefit the staff's health and safety, particularly during hot summer weather when much Sonoran pronghorn mortality occurs.

Describe the social recreational benefits: This alternative would result in no additional use of vehicles in wilderness, a recreational benefit, as compared with Alternative 1, above.

Describe the societal/political effects/benefits: None

Describe economic and timing considerations/benefits: implementing this alternative would require that the refuge or AGFD keep horses and trailers in the area ready to deploy for necropsy investigations, which are unpredictable events. The stock would necessarily be fed pelletized fodder at all times to prevent introducing exotic species to the refuge by manure. Pulling a horse trailer on the refuge non-wilderness access roads could present difficulties, as these roads are maintained to a low level. The possibility of a horse trailer becoming stuck would be high, considering that the Comprehensive Conservation Plan bans travel trailers due to high likelihood of problems.

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 2. This alternative, while requiring some operation of vehicles on refuge administrative trails, provides a greater level of staff safety and assurance that the important necropsies will occur in a timely manner than the other alternatives. The amount of driving on refuge administrative trails required for necropsy investigations should be low, given the small size of the U.S. subpopulation of Sonoran pronghorn, and the fact that not all mortalities are detected.

What are the maintenance requirements? No additional maintenance of refuge administrative trails or non-wilderness access roads would be required due to implementation of this alternative.

What standards and designs will apply? None

Develop and describe any mitigation measures that apply. The staff will only drive on administrative trails when the site of mortality is more than 5 kilometers (3.1 miles) from the nearest non-wilderness access road. Refuge vehicles will be washed and visually inspected frequently to limit the introduction of exotic plant species. Refuge vehicles operating on administrative trails will proceed at low speeds to limit dust and noise generation.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will keep a detailed log of necropsy investigations. If review of the log shows that delays resulted in poor condition specimens and inconclusive necropsies, the refuge may consider other means of accessing the mortalities more quickly.

Action 4: Accessing Wilderness to maintain and supply water to developed waters in Sonoran pronghorn habitat.

There are 15 developed waters located in Sonoran pronghorn habitat within the refuge wilderness. Maintaining these developed waters and supplying supplemental water is a component of the Sonoran pronghorn recovery plan. While maintenance of the waters is typically completed using hand tools (primitive tool) hauling supplemental water typically uses as 567-liter (1,500-gallon) heavy truck operating on refuge administrative trails.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No.**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** 15 developed waters for Sonoran pronghorn are located within refuge wilderness. The recovery team judged these locations necessary for species recovery.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Yes. Why/how?** If developed waters for Sonoran pronghorn are not maintained and supplied with water, the U.S. sub-population would risk becoming extirpated. These waters replace other off-refuge perennial water sources such as the Gila and Salt Rivers that the sup-population previously accessed in its natural state but that are now isolated from the sub-population by agricultural development, canals, roadways or other human urban development. Given the critically small size of the remaining U.S. Sonoran pronghorn population, waters have been located where there is the greatest likelihood of their being encountered by pronghorn.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **Yes, Why/how?** If the Sonoran pronghorn is extirpated, visitors who value the opportunity to see these rare animals would be adversely affected.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No** The proposed action is focused on a single species, the Sonoran pronghorn.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a critically endangered wilderness species.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** Implementing the Sonoran pronghorn recovery is a refuge purpose.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (four of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

The Refuge will continue to maintain the waters as necessary, accessing the waters on foot and using hand tools such as shovels. The refuge will haul water to the developed waters, as necessary to prevent their going dry, using a 3,578-liter (1,500-gallon) heavy truck operating on refuge administrative trails

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative is consistent with recovery of the Sonoran pronghorn, an endangered species. The operation of the water truck on refuge administrative trails should not have any noticeable effect. The refuge only hauls water when the administrative trails are free of mud, and uses measures such as high volume tires, six-wheel drive vehicles and low speed to avoid tire spinning, wash boarding of other damage to the administrative trails. Even during a drought year, the total use of administrative trails by the refuge water truck is a small fraction of the use of these trails by border law enforcement vehicles.

Describe the social/recreation effects/benefits: the operation of trucks in wilderness degrades the solitude, naturalness and quiet sought by wilderness visitors.

Describe the societal/political effects/benefits: the operation of heavy trucks in a federal wilderness area, regardless of the validity of doing so to maintain wilderness wildlife populations, degrades the untrammeled, natural and undeveloped character of the wilderness. This degradation causes a strongly negative reaction from members of society that highly value wilderness values.

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: the potential impact to recreationists is mitigated by the fact that water hauling occurs entirely during the hottest period of the summer, when visitation to the refuge is extremely low.

Describe heritage resource considerations/benefits: None

Alternative 2

The refuge will continue to maintain the developed waters in Sonoran pronghorn habitat in wilderness using hand tools. The refuge will haul water to the developed waters, as needed to keep them from going dry, using a pack string of horses, mules, or burros.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative would keep the developed waters from going dry, but would require very high numbers of pack animals on the refuge. One horse, mule or burro can carry approximately 95 liters (25 gallons) of water, and two additional pack animals are needed to carry drinking water for every ten pack animals. Replacing each trip by the 5,678-liter (1,500-gallon) water truck would thus require approximately 72 pack animal trips. During an average year, the refuge hauls water to Sonoran pronghorn waters in wilderness approximately 6 to 7 times, or 432 to 504 animal trips. This level of pack stock use on the refuge is unprecedented, and would result in changes in vegetation along the haul route from grazing, as well as disturbance of native wildlife from the presence of so many pack stock animals.

Describe the social recreational benefits: refuge visitors observing pack strings would consider their visit affected, either positively or negatively. The importance of this potential impact is mitigated in that water hauling occurs during the hottest period of the summer, when refuge visitation is very low.

Describe the societal/political effects/benefits: None

Describe health and safety concerns/benefits: water hauling typically occurs during the hottest months of the year. Travel by pack and saddle stock during these conditions would subject both the human packers and saddle/pack animals to extreme heat stress.

Describe economic and timing considerations/benefits: there are currently no commercial stock leasing companies in the refuge region. Implementing this alternative would require the refuge's maintaining a large herd of pack stock. Additional staff would be needed to husband the stock, and refuge land would have to be acquired or converted from native wildlife habitat to support the herd.

Describe heritage resource considerations/benefits: use of mule pack strings on the refuge would be a return of a traditional use dating back to Eighteenth Century.

Alternative 3

The Refuge will continue to maintain the waters as necessary, accessing the waters on foot and using hand tools such as shovels. The refuge will haul water to the developed waters, as necessary to prevent their going dry, using aerial drops of water from helicopters

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No** (no landing proposed)
Use of mechanical transport?	**No** (not on the wilderness ground surface)
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: this alternative would keep the developed waters in Sonoran pronghorn habitat from going dry. This benefit would be offset, however by impacts to wildlife from the noise and rotor wash of frequent low altitude helicopter operation over the refuge.

Describe the social/recreational effects/benefits: low altitude use of helicopters is very jarring to wilderness visitors. The noise and rotor wash of heavy helicopter operating at low altitude would degrade the solitude, naturalness and quiet sought by wilderness recreationists over a larger area and to a greater intensity than the noise of a refuge water truck.

Describe the societal/political effects/benefits: the use of heavy helicopters over a federal wilderness area, while not directly regulated by the Wilderness Act, is contrary to overall wilderness values, and causes a strongly negative reaction from members of society that highly value wilderness values.

Describe economic and timing considerations/benefits: helicopter operational costs vary directly with the size of the aircraft, but generally exceed $1,000 per hour. Hauling water by helicopter would exhaust the existing refuge operational budget during drought years. The importance disturbance of recreationists is mitigated in that water hauling occurs during the hottest period of the summer, when refuge visitation is very low.

Describe heritage resource consideration/benefits: None.

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 1. This alternative, while requiring some operation of vehicles on refuge administrative trails, would cause lower disturbance to habitat than the use of large numbers of water hauling trips by pack stock (Alternative 3) or disturbance of wildlife and wilderness solitude than hauling by helicopter (Alternative 2).

What are the maintenance requirements? No additional of maintenance of refuge administrative trails or non-wilderness access roads would be required due to implementation of this alternative.

What standards and designs will apply? None

Develop and describe any mitigation measures that apply: water hauling trips will only be made when, in the best professional opinion of refuge biologists, there is a danger that the developed water will go dry within one week. Refuge vehicles operating on administrative trails will proceed at low speeds to limit dust and noise generation.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will keep a log of all vehicle miles driven in wilderness for water hauling, as well as the water level in developed at the time of delivery. This information may be helpful in avoiding unnecessary water hauling in the future.

Action 5: Installing photovoltaic water level sensors in developed waters in refuge wilderness.

The refuge proposes to identify potential sources of commercially available photovoltaic powered water level sensors with remote transmission capability. If such sensors were available, one would be installed in every developed water on the refuge wilderness (both waters in Sonoran pronghorn and desert bighorn sheep habitat).

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**.
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** The waters slated for remote monitoring occur in wilderness
4. Is there a special provision in legislation that allows this project activity? **No**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Yes. Why/how?** The proposed water level sensors would allow more accurate determination of the need to haul water, without entering the wilderness to examine the waters. This should allow reduced intrusions from unnecessary water hauling.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **Yes, Why/How?** The reduction in truck use in wilderness yielded from real-time, accurate water level readings would benefit backcountry visitors by decreasing the likelihood they would encounter a refuge management vehicle in wilderness. The importance of this change is limited, however, by the fact that most water hauling occurs during the summer, when visitation to the refuge is very low.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **Yes, Why/How?** The sensors should reduce water hauling, thus decreasing the evidence of human manipulation of wilderness.
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No**
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a critically endangered wilderness species and the conservation of a wilderness dependent wildlife species (desert bighorn sheep).
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** While avoiding unnecessary water hauling certainly would be a convenience measure, it would also reduce vehicle use in wilderness.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (five of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

If suitable water level monitors can be acquired, refuge staff will hike from the nearest non-wilderness access point to install them in developed waters and then hike back to their vehicles in non-wilderness.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**.

Describe the biophysical effects/benefits of this alternative: implementing this alternative would result in increased hiking by refuge staff within wilderness. This could result in some physiological stress to refuge staff members.

Describe the social/recreation effects/benefits: None.

Describe the societal/political effects/benefits: None

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: Hiking to developed waters would divert staff from other refuge administration activities.

Describe heritage resource considerations/benefits: None

Alternative 2

If suitable water level monitors can be acquired, refuge staff will install them during water hauling trips to the developed waters.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**.

Describe the biophysical effects/benefits of this alternative: implementing this alternative would reduce hiking by refuge staff, as compared to Alternative 1 above, resulting in less stress to staff. As the water level monitors would be installed during scheduled water hauling trips, this alternative would not involve any increase in vehicle use in wilderness.

Describe the social/recreation effects/benefits: None.

Describe the societal/political effects/benefits: None

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: This action would result in the water level monitors being installed when supplemental water was judged to be needed at each developed water. Combining trips for water hauling and water level sensors would increase efficiency as compared to scheduling separate hiking trips for water level sensor installation.

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 2. This alternative accomplishes the objective of installing water level sensors in developed waters located in wilderness most efficiently without additional use of motorized or mechanized transport in wilderness.

What are the maintenance requirements? No additional of maintenance of refuge administrative trails or non-wilderness access roads would be required due to implementation of this alternative.

What standards and designs will apply? None

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will verify that sensor readout is accurate by estimating water level on required water hauling trips to the developed waters.

Action 6: Developing or Redeveloping Sonoran pronghorn developed waters in refuge wilderness.

The refuge will construct additional Sonoran pronghorn developed waters as determined necessary by the recovery team. It is anticipated that some of the waters will be sited in refuge wilderness. Additionally, the refuge proposes to enlarge the storage tanks at four emergency waters constructed in 2003 and improve their water collection system. The proposed improvements may result in sufficient water collection and retention efficiency that the waters will require any hauling of supplemental water only during periods of prolonged drought.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**.
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** The four waters slated for redevelopment are located in refuge wilderness. Any new waters proposed for development in wilderness would only be so located if necessary to serve existing populations of pronghorn.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Yes. Why/how?** Developed waters for Sonoran pronghorn would replace other off-refuge perennial water sources such as the Gila and Salt Rivers that the sup-population previously accessed in its natural state but that are now isolated from the sub-population by agricultural development, canals, roadways or other human urban development. The proposed redevelopment of four existing emergency waters will allow them to be filled by natural runoff and reduce the need for water hauling.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **Yes, How/Why?** The proposed improved waters will require much less water hauling than the existing waters, thus decreasing the likelihood that a visitor will encounter a refuge management vehicle operating in wilderness. The improved waters also are much more natural looking than previous types of developed waters. Only a small drinking trough and water collection inlets in arroyos would be visible from the soil surface. Refuge visitors will therefore see less evidence of structures in wilderness.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No**.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a critically endangered wilderness species.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** Recovery of Sonoran pronghorn is mandated by the Endangered Species Act.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (four of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

The Refuge will construct new waters as needed, and reconstruct four existing developed waters in Sonoran pronghorn habitat within the refuge wilderness. The refuge will use volunteer labor from various non-profit organizations and all excavation will be done by hand using hand shovels and pickaxes (primitive tool). Work crews will hike to the project sites from non-wilderness access points. The water reservoir systems will be airlifted to the sites by helicopters. Nineteen to twenty-three flights will be required for each water. Complete excavation, installation and covering will require two weeks per developed water, and the ten-person crews will camp near the site during this period.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**Yes**
Use of mechanical transport?	**No**
Creating a structure or installation?	**Yes**
Other impacts to wilderness character?	**Yes** Temporary disturbance of solitude due to large work crew camping for two weeks per project.

Describe the biophysical effects/benefits of this alternative: implementing this alternative is consistent with recovery of the Sonoran pronghorn, an endangered species. Noise and rotor wash associated multiple, low altitude helicopter trips over the refuge wilderness would adversely affect wildlife and soils. The presence of ten-person work crews on each project site for two weeks per project would create a problem with heavy loads of human sanitary waste in a typically very low organic load environment.

Describe social/recreation effects/benefits: the presence of work crews at the work site for two weeks per project could disrupt another visitor's opportunities to enjoy wilderness solitude and an unconfined type of primitive recreation.

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: The work should be conducted during the cooler time of the year, when stress on both Sonoran pronghorn and work crews will be lowest, but prior to beginning of the Sonoran pronghorn fawning season (prior to March 15).

Describe heritage resource considerations/benefits: None

Alternative 2

The Refuge will construct new waters as needed, and reconstruct four existing developed waters in Sonoran pronghorn habitat within the refuge wilderness. The refuge will use volunteer labor from various non-profit organizations. Excavation will use a backhoe driven to the site via non-wilderness roads and administrative trails in wilderness. Work crews will hike to the project sites from non-wilderness access points. The water reservoir systems will be airlifted to the sites by helicopters. Eighteen to twenty-two round helicopter trips will be required to and from the site of each new or redeveloped water, depending on the number of reservoir components needed. Complete excavation, installation and covering will require two days per developed water, and the ten-person crews will camp near the site during this period.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**Yes**
Landing of airplanes?	**No**
Landing of helicopters?	**Yes**
Use of mechanical transport?	**No**
Creating a structure or installation?	**Yes**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: this alternative would contribute to the recovery of Sonoran pronghorn, an endangered species. Rotor wash and noise from the high intensity of low-altitude helicopter use required by this alternative would adversely affect wildlife and has the potential to disturb soils. The presence of ten-person work crews on each project site for two days per project would cause fewer problems associated with waste than would the longer duration of stay necessary under the first alternative. Driving the backhoe (one round trip to and from each new or redeveloped water site) should not appreciably effect the administrative trails, given the backhoe's high-floatation, off-road tires, low speed of driving and the high background volume of vehicle use on administrative trails by border law enforcement personnel.

Describe social/recreation effects/benefits: the high intensity of helicopter use at low altitude would result in disturbance of wilderness solitude and naturalness. The presence of mechanized equipment (a backhoe) and the work crews at the work site could disrupt a visitor's opportunities to enjoy wilderness solitude and an unconfined type of primitive recreation. While this would be an intense invasion of the visitor's experience due to the presence of mechanized equipment, and low altitude over flights, the overall shorter time frame (two versus 14 days) would reduce the likelihood of a visitor impacts.

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: The work should be conducted during the cooler time of the year, when stress on both Sonoran pronghorn and work crews will be lowest, but prior to beginning of the Sonoran pronghorn fawning season (prior to March 15).

Describe heritage resource considerations/benefits: None

Alternative 3

The Refuge will construct new waters as needed, and reconstruct four existing developed waters in Sonoran pronghorn habitat within the refuge wilderness. The refuge will use volunteer labor from various non-profit organizations. Excavation will use a backhoe driven to the site via non-wilderness roads and administrative trails in wilderness. Work crews will hike to the project sites from non-wilderness access points. The water reservoir systems will be hauled to the sites using a truck and trailer combination. Two round trips to and from each site will be required. Complete excavation, installation and covering will require two days per developed water, and the ten-person crews will camp near the site during this period.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**Yes**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**Yes**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: this alternative would contribute to the recovery of Sonoran pronghorn, an endangered species. The presence of ten-person work crews on each project site for two days per project would cause much less problem associated with waste than would the longer duration of stay necessary under the first alternative. Driving the backhoe (one round trip to and from each new or redeveloped water site) and reservoir component truck (two round trips to and from each new or redeveloped water site) should not appreciably effect the administrative trails, given the backhoe's high-floatation, off-road tires, low speed of driving by the backhoe and delivery truck and the high background volume of vehicle use on administrative trails by border law enforcement personnel.

Describe social/recreation effects/benefits: in presence of mechanized equipment (a backhoe) and the work crews at the work site could disrupt another visitor's opportunities to enjoy wilderness solitude and an unconfined type of primitive recreation. While this would be a more intense invasion of the visitor's experience due to the presence of mechanized equipment, the overall much shorter time frame (two versus 14 days) would minimize the likelihood of a visitor's being affected.

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: The work should be conducted during the cooler time of the year, when stress on both Sonoran pronghorn and work crews will be lowest, but prior to beginning of the Sonoran pronghorn fawning season (prior to March 15)..

Describe heritage resource considerations/benefits: None

Alternative 4

The Refuge will construct new waters as needed and reconstruct four existing developed waters in Sonoran pronghorn habitat within the refuge wilderness. The refuge will use volunteer labor from various non-profit organizations. Excavation will use hand tools. Work crews will hike to the project sites from non-wilderness access points. The water reservoir systems will be hauled to the sites using a truck and trailer combination. Two round trips to and from each site will be required. Complete excavation, installation and covering will require two weeks per developed water, and the ten-person crews will camp near the site during this period.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**Yes**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**Yes**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: this alternative would contribute to the recovery of Sonoran pronghorn, an endangered species. The presence of ten-person work crews on each project site for two weeks per project would create a problem with heavy loads of human sanitary waste in a typically very low organic load environment.

Describe social/recreation effects/benefits: the use of a truck to haul reservoir components into the refuge could adversely affect the wilderness experience of visitors who see or hear the truck operating in wilderness. The use of primitive tools (picks and shovels) to excavate for the reservoirs could be used as a teaching example about the appropriateness of primitive tools in wilderness.

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: The work should be conducted during the cooler time of the year, when stress on both Sonoran pronghorn and work crews will be lowest, but prior to beginning of the Sonoran pronghorn fawning season (prior to March 15).

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 4. This alternative, while requiring some operation of vehicles on refuge administrative trails, has the least overall impact to wilderness of the four proposed alternatives.

What are the maintenance requirements? No additional of maintenance of refuge administrative trails or non-wilderness access roads would be required due to implementation of this alternative.

What standards and designs will apply? All aboveground visible components of the improved waters will be painted to match the background soil color.

Develop and describe any mitigation measures that apply: when construction is complete, all grades will be returned as close as is possible to pre-construction contour. During soil disturbance, the refuge will implement erosion controls and other best management practices to minimize erosion and dust generation. Work crews will use portable sanitary facilities to allow efficient collection and removal of sanitary wastes.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will take pre- and post construction photographs of each site and will periodically monitor project sites for erosion or settling.

Action 7: Annually collect water samples from all developed waters for wildlife (in both Sonoran pronghorn and desert bighorn sheep habitat) for analysis and identification of potential pathogens. The water samples should be collected at the same time of the year in order to facilitate effective comparisons of water quality and pathogen presence between years.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**.
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** Several of the waters slated for sample collection occur in wilderness
4. Is there a special provision in legislation that allows this project activity? **No**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Yes. Why/how?** The proposed water sampling would allow identification of any unnatural levels or varieties of pathogens present in the developed waters. Removal of such pathogen sources would enhance the naturalness of the refuge wilderness.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **Yes Why/How?** The proposed action would allow assurance that wildlife waters are not introducing pathogens into the wilderness environment
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a critically endangered wilderness species and the conservation of a wilderness dependent wildlife species (desert bighorn sheep).
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** This action is proposed to protect the health of refuge wildlife populations.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (four of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Once each year refuge staff will hike from the nearest non-wilderness access point to each wildlife water and collect a water sample. The sample will be sealed and stored in a cooler during transport to a laboratory for analysis. This sampling would occur during the cool season when visiting the developed waters is less likely to affect stressed wildlife populations and hiking in the refuge is less strenuous.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**.

Describe the biophysical effects/benefits of this alternative: implementing this alternative would allow collection of water samples with minimal biophysical effects. Should pathogens be identified, benefits to refuge wildlife populations would result, as waters with high pathogen loading could be modified to avoid sources of contamination.

Describe the social recreational benefits: None, other than possible improvement of refuge wildlife population health, which indirectly benefits individuals and groups concerned about wildlife health.

Describe the societal/political effects/benefits: None

Describe health and safety and concerns/benefits: No human health and safety effects.

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Alternative 2

Once each year refuge staff will collect a water sample from each developed water during visits for water hauling. If no trips are made to some of the developed waters during a particular year, the refuge will schedule trips to those waters for sampling. The sample will be sealed and stored in a cooler during transport to a laboratory for analysis. This sampling would occur opportunistically during the water-hauling season, typically the hottest time of the year.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative would allow collection of water samples with minimal biophysical effects. Should pathogens be identified, benefits to refuge wildlife populations would result.

Describe the social recreational benefits: None, other than possible improvement of refuge wildlife population health, which indirectly benefits individuals and groups concerned about wildlife health.

Describe the societal/political effects/benefits: None

Describe health and safety and concerns/benefits: None

Describe economic timing considerations/benefits: while combining water sampling with water hauling, the refuge would enjoy an increase in operational efficiency. This efficiency would be offset by collecting samples at non-standard times, thus reducing the comparability of samples collected over several years.

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 2. This alternative accomplishes the objective of collecting samples from developed waters located in wilderness with no additional use of motorized or mechanized transport in wilderness.

What are the maintenance requirements? No additional of maintenance of refuge administrative trails or non-wilderness access roads would be required due to implementation of this alternative.

What standards and designs will apply? None

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will track water analysis results over time to identify any trends.

Action 8: Develop up to three forage enhancements within Sonoran pronghorn habitat.

The Sonoran pronghorn recovery plan calls for the establishment and evaluation of forage enhancement plots on the Barry M. Goldwater Range, north of the refuge. Given the apparent early success of these plots, and the critical status of the U.S. sub-population of Sonoran pronghorn, the Sonoran pronghorn recovery team proposed development of four plots on the refuge. One forage enhancement has been developed south of Charlie Bell Road, in refuge non-wilderness.

Forage enhancements are areas of approximately 10 hectares (25 acres), selected on sites having greater than average vegetative cover in areas of documented frequent pronghorn presence. The area is prepared by first thinning creosote bush to create openings. Selected creosote bush is killed by burning with a hand-held weed burner. This improves the area for pronghorn by reducing cover, and thus the potential for predator ambush. Approximately 2.4 hectares (6 acres) within the enhancement is then rigged for sprinkler irrigation. The site is irrigated during low rainfall years to mimic natural rainfall of a slightly wetter than average year. No supplemental seeds are planted, as the ground should have adequate seed resources and off-site seed sources may be contaminated with exotic species.

Wilderness issues related to forage enhancements include loss of naturalness and untrammeled character due to irrigation, development of a well or water pipeline, and vegetation manipulation.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No.**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **Not entirely** The forage enhancements must be located in suitable habitat within the species' range. Most suitable sites on the refuge are located in wilderness. The exact sites for forage enhancements have not yet been located. Forage enhancements have been proposed both in refuge wilderness and refuge non-wilderness.
4. Is there a special provision in legislation that allows this project activity? **No**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Yes. Why/how?** The issue is related to recovery of the Sonoran pronghorn. If the issue is not resolved, extirpation of the U.S. sub-population, a natural component of the wilderness fauna, could result
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No** – the proposed action is aimed at single species recovery.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a critically endangered wilderness species.

6. Is this an issue for reasons other than convenience or cost of administration? **Yes**
   Why/How? This action is proposed to implement the Sonoran pronghorn recovery plan.

Step 1 conclusion: As administering the activity entirely in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (three of six questions above answered "yes") it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge staff, in consultation with the Sonoran pronghorn recovery team, will survey the refuge Sonoran pronghorn habitat to identify the three sites most favorable for additional forage enhancements. It is considered likely that at least one site will be located within wilderness. During preparation of the site well drilling rig will be required on site, a windmill will be erected to pump water from the well, irrigation lines will be installed and weed burner will be used to clear creosote bush.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**Yes**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**Yes**
Other impacts to wilderness character?	**Yes** Vegetation manipulation, irrigation in desert

Describe the biophysical effects/benefits of this alternative: implementing this alternative would create additional sources of forage for the endangered Sonoran pronghorn. It would also artificially alter the plant composition and abundance of wilderness, which may alter the density and distribution of insects and predators in the wilderness.

Describe the social recreational benefits: implementing this alternative would result in adding visible structures such as water wells and windmills in wilderness. The presence of such alteration would adversely affect the recreational experience of refuge visitors.

Describe the societal/political effects/benefits: implementing this alternative should yield the societal benefit of aiding recovery of an endangered species. Implementing this alternative would have the negative societal effect of altering areas within the Wilderness Preservation System.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: Implementing this alternative would change the natural appearance of a traditionally wild landscape

Alternative 2

Refuge staff, in consultation with the Sonoran pronghorn recovery team, will survey the refuge Sonoran pronghorn habitat to identify the three sites most favorable for additional forage enhancements. It is considered likely that at least one site will be located within wilderness. Water will be brought to the site via a pipeline from an existing well, pipes for the line will be brought into the wilderness using a truck, irrigation lines will be installed and weed burner will be used to clear creosote bush.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**Yes**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**Yes**
Other impacts to wilderness character?	**Yes** Vegetation manipulation, irrigation in desert

Describe the biophysical effects/benefits of this alternative: implementing this alternative would create additional sources of forage for the endangered Sonoran pronghorn. It would also artificially alter the plant composition and abundance of wilderness. The presence of a 10-centimeter (4-inch) pipe on the ground surface could alter drainage patterns and would restrict movement of some small animals.

Describe the social and recreational benefits: implementing this alternative would result in adding installations such as irrigation lines and water pipelines in wilderness. The presence of such alteration would adversely affect the recreational experience of refuge visitors.

Describe the societal/political effects/benefits: implementing this alternative should yield the societal benefit of aiding recovery of an endangered species. Implementing this alternative would have the negative societal effect of altering areas within the Wilderness Preservation System.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: Implementing this alternative would change the natural appearance of a traditionally wild landscape

Alternative 3

Refuge staff, in consultation with the Sonoran pronghorn recovery team, will survey only non-wilderness refuge Sonoran pronghorn habitat to identify the three sites most favorable for additional forage enhancements. Development of the forage enhancements will proceed as described for Alternative 1 above.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative would restrict the location of forage enhancements to a small fraction of the refuge Sonoran pronghorn habitat. Such restriction would limit the effectiveness of the forage enhancements and could contribute to extirpation of the U.S. sub-population of Sonoran pronghorn.

Describe the social recreational benefits: none.

Describe the societal/political effects/benefits: none other than those related to Sonoran pronghorn recovery.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None.

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is a combination of number s 1 and 2. Essentially, where distance and terrain permit, water will be piped to the forage enhancements from wells located in non-wilderness. When this is not feasible, new water well will be drilled and windmills erected in wilderness.

What are the maintenance requirements? The forage enhancements will require regular inspection and maintenance of water lines, irrigation components, and windmills.

What standards and designs will apply? Any windmill will be designed to resemble the type of irrigation windmill traditionally used by ranches in the region. Irrigation lines will be painted to blend visually with the soil.

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? Upon recovery and delisting of the Sonoran pronghorn, all structures and facilities of the forage enhancements will be dismantled and removed.

Action 9: Coyote management

The Sonoran pronghorn recovery plan calls reduction of predation pressure through the selective removal of coyotes from specific areas at times of the year when pronghorn are most susceptible to predation. The refuge proposes to exceed the minimum of coyote control by adding a component of coyote study, including radio collaring coyotes to study their movements relative to Sonoran pronghorn movements and their use of developed waters.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No.**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **Not entirely.** Restricting coyote management activities to the non-wilderness portion of the refuge would limit the activities' effectiveness, as only a fraction of the refuge Sonoran pronghorn habitat occurs in non-wilderness.
4. Is there a special provision in legislation that allows this project activity? **No**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No** – the proposed action is aimed at single species recovery.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a critically endangered wilderness species.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** This action is proposed to implement the Sonoran pronghorn recovery plan.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (two of six questions above answered "yes") it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge staff or contract trappers will set padded leg-hold traps to capture coyotes for radio collaring. The trapper will walk to and from the trap line from a non-wilderness access point. The traps will be placed and baited to avoid capture of non-target species (primarily birds of prey). Any non-target species will be released from the traps. Trap lines will be checked daily to minimize injury/stress to captured animals.

Coyote removal (when warranted by Sonoran pronghorn population size [fewer than 100 Sonoran pronghorn in U.S. subpopulation] and weather conditions [annual rainfall less than 50 percent of the average]) will be accomplished by calling in coyotes with a commercially produced predator call and shooting. The shooter will walk to and from the site from a non-wilderness access point.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**Yes** Placing radio collars on native wildlife, reducing natural predation.

Describe the biophysical effects/benefits of this alternative: other than changing the predator density, this alternative would have little effect on wilderness biophysical conditions. Trapping to radio collar coyotes would likely result in a female-biased sample, as female coyotes are more easily trapped than males (John Morgart, USFWS, pers. comm., 2004). This would artificially depress the refuge coyote population.

Describe the social recreational benefits: implementing this alternative could result in conflicts between coyote trappers/control personnel and recreational visitors. The likelihood of such conflict however is low due to very low levels of backcountry visitation at the refuge.

Describe the societal/political effects/benefits: predator control, as proposed, is a highly controversial practice. Groups and individuals opposed to lethal control would be adversely affected by this alternative.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Alternative 2

Refuge or AGFD staff will capture coyotes for radio collaring using net guns fired from helicopters. The helicopter will then land nearby and staff will exit the helicopter to collar and release the captured animals.

Coyote removal (when warranted by Sonoran pronghorn population size and weather conditions [fewer than 100 Sonoran pronghorn in U.S. subpopulation] and weather conditions [annual rainfall less than 50 percent of the average]) will be accomplished by calling in coyotes with a commercially produced predator call and shooting. The shooter will walk to and from the site from a non-wilderness access point.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**Yes**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**Yes** Placing radio collars on native wildlife, reducing natural predation.

Describe the biophysical effects/benefits of this alternative: implementing this alternative would result in the landing of helicopters in wilderness. The noise and rotor wash from the helicopters would adversely affect refuge wildlife and soils. This alternative would also result in artificial depression of the refuge coyote population.

Describe the social recreational benefits: observing or hearing low altitude operation and land of helicopters in the refuge wilderness would greatly compromise the wilderness recreational visitor. Similarly the possibility of conflicts between recreational visitors and coyote removal personnel exists. The likelihood of such conflict however is low due to very low levels of backcountry visitation at the refuge.

Describe the societal/political effects/benefits: predator control, as proposed, is a highly controversial practice. Groups and individuals opposed to lethal control would be adversely affected by this alternative.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 2. Occasional use and landing of helicopters in wilderness, while more intrusive than the placement of traps, is preferred due to its greater effectiveness in obtaining a representative sample of the refuge coyote population.

What are the maintenance requirements? No additional maintenance would be required.

What standards and designs will apply? None

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? None.

Action 10: Population Surveys and Monitoring

The Cabeza Prieta CCP calls for conducting surveys for the presence of several species of conservation interest, including the endangered lesser long-nosed bat and recently delisted cactus ferruginous pygmy-owl, among others. The CCP also calls monitoring population status of several other species of conservation or recreational interest, including LeConte's thrasher, Gila monster, mule deer and many others.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** In order for population surveys and monitoring to be valid, they should cover as much of the potential habitat as is possible.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? Yes **Why/How?** The data collection proposed will provide valuable information about the wilderness' wildlife species composition.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** These species composition data will help the refuge to design long-term species conservation measures and detect any species declines.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** The issue is collection of appropriate data.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (three of six questions above answered "yes") it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods. Survey plots or transects will be identified in the field using global position system equipment so that no permanent physical markings in wilderness will be necessary.

Alternative 1

Refuge staff, contracted researchers or volunteers will access wilderness survey/monitoring sites on foot from the nearest non-wilderness access point. Some survey/monitoring efforts may require several days in the field.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: no direct biophysical effects; this alternative serves to gather data.

Describe the social recreational benefits: no direct effects; future visitors would be able to obtain more complete information regarding the refuge's fauna from the results of this alternative.

Describe the societal/political effects/benefits: None.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

Alternative 1 is the only alternative examined, as it is fully compliant with the Wilderness Act of 1964 and satisfies the refuge's data needs.

What are the maintenance requirements? No facilities will be maintained in wilderness.

What standards and designs will apply? Only survey/monitoring protocols will apply. These affect the execution of fieldwork, not wilderness features.

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will maintain survey/monitoring records.

Action 11: Radio collaring desert bighorn sheep

Conservation of desert bighorn sheep was central to the establishment of the refuge. The CCP calls for maintaining operable radio collars on 10 percent of the refuge population. In order to accurately estimate the population of the species, which inhabits inaccessible terrain, radio collaring is essential. Refuge and AGFD staffs conduct collaring operations from helicopters, using net guns to capture animals and then landing the helicopter nearby to fit the animal with a radio collar and take biological measurements of the collared animal. This action thus involves landing of aircraft in designated wilderness.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** Discussion: some occupied desert bighorn sheep habitat lies within non-wilderness lands of the refuge. While it would be feasible to conduct all radio collar operations in these areas, such selection of animals occurring in non-wilderness would result in a non-representative sample of the population being collared. This skewing of the sample could result in drawing inaccurate conclusions regarding the status of the overall population, and is thus inappropriate.
4. Is there a special provision in legislation that allows this project activity? **No**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **Yes, Why/How?** – Some individuals visit the refuge primarily to observe and/or photograph large mammals such as desert bighorn sheep. Additionally, desert bighorn sheep hunting on the refuge benefits from knowledge of the status and movements of the refuge desert bighorn sheep population.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No**
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a high-profile wilderness dependent species.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** The use of helicopters and their landing in wilderness is not a function of cost or convenience, but rather the only effective method to accomplish radio collaring of desert bighorn sheep, a necessary refuge management activity.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (three of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

The refuge and AGFD staff will capture and collar desert bighorn sheep using net guns fired from helicopters and then land the helicopters to provide access to the captured animals for radio collaring.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**Yes**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**Yes** (some animals will be collared)

Describe the biophysical effects/benefits of this alternative: implementing this alternative would result in maintaining functioning radio collars on 10 percent of the refuge desert bighorn sheep population

Describe the societal/political effects/benefits: conservation of desert bighorn sheep is a high priority of the State of Arizona. The refuge is an important player in this conservation effort and accurate population data supports the effort.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None.

Describe heritage resource considerations/benefits: None

Selected alternative is Alternative 1. No other alternatives are viable for radio collaring desert bighorn sheep, given the steep terrain of desert bighorn sheep habitat, and the high likelihood of injury in darting sheep.

Action 12: Desert bighorn sheep population monitoring

Monitoring the size and movement of the refuge desert sheep population is an important component of species conservation and regulation of the desert bighorn sheep hunt. AGFD and refuge staffs conduct a refuge-wide population survey every three years. Using a group-siting model from aircraft.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **Yes** AGFD aircraft are used in the airspace over the wilderness, but do no land in wilderness.
4. Is there a special provision in legislation that allows this project activity? **No**

As the activity can be undertaken entirely outside of wilderness, using aircraft in the airspace over the wilderness. No further analysis is necessary.

Action 13: Accessing wilderness to maintain and supply water to developed waters in desert bighorn sheep habitat.

There are 14 developed waters located in desert bighorn sheep habitat within the refuge wilderness. Two of these, Bassarisc Tank and Charlie Bell Well, are also are used by Sonoran pronghorn. Their maintenance and water supply is addressed above under Action 4. The refuge maintains and/or hauls water, at least occasionally, to 11 of the developed waters: Buck Peak, Halfway, Cabeza Prieta, Buckhorn, Tule, Tuseral, Senita, North Pinta, Granite, Heart and Eagle Tanks. These waters have been maintained and supplied with supplemental water, as needed, for many years. The University of Arizona is currently reviewing the results of a five year study of desert bighorn sheep response to denying access to three of the waters (see EIS, Section 2.5.1.2.1). Until the results of this study (or other studies, if this one is not determined to be definitive) are available, the refuge will continue to manage developed waters as essential to desert bighorn sheep population viability. If studies show that desert bighorn sheep are not dependent on developed waters, the refuge will consider altering current maintenance and water hauling practices.

Maintenance of the waters is typically completed using hand tools (primitive tool). Hauling supplemental water typically uses as 5,678-liter (1,500-gallon) heavy truck operating on refuge administrative trails.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**.
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No**. Eleven developed waters are maintained and supplied in refuge wilderness. The wilderness waters are a component of species conservation.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Yes. Why/how?** If developed waters for desert bighorn sheep are not maintained and supplied with water, the refuge populations would risk becoming severely depleted or extirpated. These waters compensate for anthropogenic decimating factors not operating on the desert bighorn sheep populations prior to modern times.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **Yes Why/How?** The desert bighorn sheep, considered a wilderness dependent species by several researchers (Leopold, 1933; Hendee et al., 2002), is a key indicator of naturalness of the wilderness. Species conservation is thus consistent with wilderness values.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of a wilderness dependent species.

6. Is this an issue for reasons other than convenience or cost of administration? **Yes**
   Why/How? Conservation of desert bighorn sheep is a refuge purpose

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (four of six questions above answered "yes") it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

The Refuge will continue to maintain the waters as necessary, accessing the waters on foot and using hand tools such as shovels. The refuge will haul water to the developed waters, as necessary to prevent their going dry, using a 3,578-liter (1,500-gallon) heavy truck operating on refuge administrative trails

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**Yes Why/How?** Maintaining developed waters adversely affects untrammeled character.

Describe the biophysical effects/benefits of this alternative: implementing this alternative is consistent with conservation of desert bighorn sheep. The physical effects of fewer than 20 truck trips on administrative trails per year should be negligible, given the routine use of these trails by border law enforcement personnel.

Describe the social/recreation effects/benefits: the operation of trucks in wilderness has a very negative effect on recreationists who see or hear them. This potential impact is mitigated by the fact that water hauling occurs entirely during the hottest period of the summer, when visitation to the refuge is extremely low.

Describe the societal/political effects/benefits: the operation of heavy trucks in a federal wilderness area, regardless of the validity of doing so to maintain wilderness wildlife populations, is contrary to overall wilderness values, and causes a strongly negative reaction from members of society that highly value wilderness values.

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Alternative 2

The refuge will continue to maintain the developed waters in desert bighorn sheep habitat in wilderness as described for Alternative 1. The refuge will haul water to the developed waters, as needed to keep them from going dry, using a pack string of horses, mules, or burros.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative would keep the developed waters from going dry, but would require very high numbers of pack animals on the refuge. One horse, mule or burro can carry approximately 95 liters (25 gallons) of water, and two additional animals are needed to carry drinking water for every ten pack animals. Replacing each trip by the 5,678-liter (1,500-gallon) water truck would thus require approximately 72 pack animal trips. This level of stock use on the refuge is unprecedented, and would result in changes in vegetation along the haul route from grazing, as well as disturbance of native wildlife from the presence of so much saddle/pack stock.

Describe the social and recreational benefits: refuge visitors observing pack strings would consider their visit affected, either positively or negatively. The importance of this potential impact is mitigated in that water hauling occurs during the hottest period of the summer, when refuge visitation is very low.

Describe the societal/political effects/benefits: None

Describe health and safety concerns/benefits: water hauling typically occurs during the hottest months of the year. Travel by pack and saddle stock during these conditions would subject both the human packers and saddle/pack animals to extreme heat stress.

Describe economic and timing considerations/benefits: there are currently no commercial stock leasing companies in the refuge region. Implementing this alternative would require that the refuge maintain a large herd of pack stock. Additional staff would be needed to husband the stock, and refuge land would have to be acquired or converted from native wildlife habitat to support the herd.

Describe heritage resource considerations/benefits: use of mule pack strings on the refuge would be a return of a traditional use dating back to Eighteenth Century.

Alternative 3

The Refuge will continue to maintain the waters as necessary, accessing the waters on foot and using hand tools such as shovels. The refuge will haul water to the developed waters, as necessary to prevent their going dry, using aerial drops of water from helicopters

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No** (no landing proposed)
Use of mechanical transport?	**No** (not on the wilderness ground surface)
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: this alternative would keep the developed waters in desert bighorn sheep habitat from going dry. This benefit would be offset, however by impacts to wildlife from the noise and rotor wash of frequent low altitude helicopter operation over the refuge. While border patrol helicopters regularly operate over the refuge wilderness, the aircraft required to haul water would be considerably larger and would operate at very low altitudes.

Describe the social/recreational effects/benefits: low altitude use of helicopters is very jarring to wilderness visitors. The importance of this potential impact is mitigated in that water hauling occurs during the hottest period of the summer, when refuge visitation is very low.

Describe the societal/political effects/benefits: the use of heavy helicopters over a federal wilderness area, while not directly regulated by the Wilderness Act, is contrary to overall wilderness values, and causes a strongly negative reaction from members of society that highly value wilderness values.

Describe economic and timing considerations/benefits: helicopter operational costs vary directly with the size of the aircraft, but generally exceed $1,000 per hour. Hauling water by helicopter would exhaust the existing refuge operational budget during drought years.

Describe heritage resource consideration/benefits: None.

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 1. This alternative, while requiring some operation of vehicles on refuge administrative trails, would cause lower disturbance to habitat than the use of large numbers of water hauling trips by pack stock (Alternative 2) or disturbance of wildlife and wilderness solitude than hauling by helicopter (Alternative 3).

What are the maintenance requirements? No additional of maintenance of refuge administrative trails or non-wilderness access roads would be required due to implementation of this alternative.

What standards and designs will apply? None

Develop and describe any mitigation measures that apply: water hauling trips will only be made when, in the best professional opinion of refuge biologists, there is a danger that the developed water will go dry within one week. Refuge vehicles operating on administrative trails will proceed at low speeds to limit dust and noise generation.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will keep a log of all vehicle miles driven in wilderness for water hauling. This record will be available for public review.

Action 14: Redeveloping desert bighorn sheep developed waters in refuge wilderness.

The refuge has plans to redevelop ten of the developed waters in wilderness desert bighorn sheep habitat. The proposed improvements include placing water storage tanks with multiple point rainwater collectors under cement covers shaped and tinted to resemble the surrounding natural bedrock. The water tanks would supply water to small drinking troughs near the location of the existing developed water. Such improved desert bighorn sheep waters have been constructed in desert regions of Southern California, and have provided reliable water sources requiring very little supplemental water hauling maintenance. They also have very little visual impact, as most of the components are hidden by a natural-appearing cement cover (John Herbert, AGFD, peers. comm., 2002).

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No.**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** The developed waters proposed for improvement are located within refuge wilderness, and the proposed improvements are aimed at making their continued operation less intrusive on wilderness character
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **Yes Why/How?** Several of the existing developed waters in desert bighorn sheep habitat are highly visually intrusive, artificial appearing structures. The proposed action would replace these structures with natural appearing ones that are not substantially noticeable.
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **Yes Why/How?** – the proposed upgrades to desert bighorn sheep waters would reduce the unnatural appearance of these features and also significantly reduce the need to haul water in wilderness, thus reducing vehicle use.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** The proposed upgrades to developed waters should be long lasting.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** While the proposed upgrades would increase the efficiency of wilderness administrations, they would also reduce visual intrusion and reduce vehicle operation in wilderness.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (four of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

The Refuge will redevelop ten existing developed waters in desert bighorn sheep habitat within the refuge wilderness. The refuge will use volunteer labor from various non-profit organizations and all excavation will be done by hand using hand shovels and pickaxes (primitive tool). Work crews will hike to the project sites from non-wilderness access points. A batch cement mixer with concrete and water, the water reservoir systems and necessary concrete reinforcement material will be airlifted to the sites by helicopters. This would require 19 to 22 round trips to and from the work site for each redevelopment project. Complete excavation, installation and covering will require two weeks per developed water, and the ten-person crews will camp near the site during this period.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**Yes**
Landing of airplanes?	**No**
Landing of helicopters?	**Yes**
Use of mechanical transport?	**No**
Creating a structure or installation?	**Yes**
Other impacts to wilderness character?	**Yes** Temporary disturbance of solitude due to large work crew camping for two weeks per project.

Describe the biophysical effects/benefits of this alternative: implementing this alternative would result in the presence of ten-person work crews on each project site for two weeks per project would create a problem with heavy loads of human sanitary waste in a typically very low organic load environment. Use of helicopters for multiple low level flights to deliver materials would adversely impact wildlife and wilderness solitude.

Describe social/recreation effects/benefits: implementing this alternative would result in many low-altitude helicopter flights over the refuge wilderness and the presence of work crews at the wilderness work site for two weeks per project. The increased noise and activity associated with these activates could disrupt another visitor's opportunities to enjoy wilderness solitude and an unconfined type of primitive recreation.

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: None.

Describe heritage resource considerations/benefits: None

Alternative 2

The Refuge will redevelop ten existing developed waters in desert bighorn sheep habitat within the refuge wilderness. The refuge will use volunteer labor from various non-profit organizations. Work crews will hike to the project sites from non-wilderness access points. Excavation will be done by a backhoe driven to the site on non-wilderness access roads and refuge administrative trials. A batch cement mixer with concrete and water, the water reservoir systems and necessary concrete reinforcement materials will be delivered to the site by truck via non-wilderness access roads and refuge administrative trails. Complete excavation, installation and covering will require three round trips to and from the work site per developed water, and the ten-person crews will camp near the site during this period.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**Yes**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**Yes**
Other impacts to wilderness character?	**Yes** temporary disturbance of wilderness solitude by operation of construction equipment and the presence of a work crew in the wilderness.

Describe the biophysical effects/benefits of this alternative: this alternative would result in temporary disturbance of wildlife and soil surfaces. The presence of ten-person work crews on each project site for three days per project would cause much fewer problems associated with waste than would the longer duration of stay necessary under the first alternative.

Describe social/recreation effects/benefits: in presence of mechanized equipment (a backhoe and cement batch mixer) and the work crews at the work site could disrupt another visitor's opportunities to enjoy wilderness solitude and an unconfined type of primitive recreation. While this would be a more intense invasion of the visitor's experience due to the presence of additional mechanized equipment, the overall much shorter time frame (two versus 14 days) would minimize the likelihood of a visitor being affected.

Describe health and safety concerns/benefits: None.

Describe economic and timing considerations/benefits: None.

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 2. This alternative, while requiring some operation of vehicles on refuge administrative trails and motorized equipment in refuge wilderness, would cause a much shorter duration of disturbance.

What are the maintenance requirements? No additional of maintenance of refuge administrative trails or non-wilderness access roads would be required due to implementation of this alternative.

What standards and designs will apply? The vault covering the reservoir system would be shaped and colored to resemble natural rock in the area of the developed water.

Develop and describe any mitigation measures that apply: when construction is complete, all grades will be returned as close as is possible to pre-construction contour. During soil disturbance, the refuge will implement erosion controls and other best management practices to minimize erosion and dust generation.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will take pre- and post construction photographs of each site and will periodically monitor project sites for erosion or settling.

Action 15: Mountain lion management

The refuge will initiate study of mountain lion predation on desert bighorn sheep, mountain lion movement in relation to desert bighorn sheep and use of developed waters in desert bighorn sheep habitat. Should the results of this study indicate excessive predation on desert bighorn sheep by mountain lion, predator population control measures will be implemented.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No –** only a small fraction of the refuge desert bighorn sheep habitat occurs outside of wilderness. Conducting predation studies on this portion of the species' range would produce biased results.
4. Is there a special provision in legislation that allows this project activity? **No**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No** – the proposed action is aimed as single species conservation.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This issue is directly related to conservation of desert bighorn sheep, a wilderness dependent wildlife species.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** This action is proposed to further one of the refuge purposes, conservation of desert bighorn sheep.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (two of six questions above answered "yes") it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge staff or contracted trappers will set padded leg-hold traps to capture mountain lions for radio collaring. The trapper will walk to and from the trap line from a non-wilderness access point. The traps will be placed and baited to avoid capture of non-target species (primarily birds of prey). Any non-target species will be released from the traps. Trap lines will be checked daily to minimize injury/stress to captured animals.

Mountain lion removal (only if warranted by demonstrated deleterious predation on desert bighorn sheep) will be accomplished by calling in mountain lions with a commercially produced predator call and shooting. The shooter will walk to and from the site from a non-wilderness access point.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**Yes** Placing radio collars on native wildlife, possibly reducing natural predation.

Describe the biophysical effects/benefits of this alternative: other than potentially changing the predator density, this alternative would have little effect on wilderness biophysical conditions. Trapping to radio collar mountain lions may prove ineffective, as there are few trappers with experience trapping this species in Arizona (John Morgart, USFWS, pers. comm., 2004). This alternative could also result in reduction of natural predation, should predator control be implemented.

Describe the social recreational benefits: implementing this alternative could result in conflicts between mountain lion trappers/control personnel and recreational visitors. The likelihood of such conflict however is low due to very low levels of backcountry visitation at the refuge.

Describe the societal/political effects/benefits: predator control, a potential outcome of this action, is a controversial practice. Groups and individuals opposed to lethal control would be adversely affected should predator control be implemented under this alternative.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Alternative 2

Refuge or AGFD staff will capture mountain lions for radio collaring using net guns fired from helicopters. The helicopter will then land nearby and staff will exit the helicopter to collar and release the captured animals.

Mountain lion removal (only if warranted by demonstrated deleterious predation on desert bighorn sheep) will be accomplished by calling in mountain lions with a commercially produced predator call and shooting. The shooter will walk to and from the site from a non-wilderness access point.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**Yes**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**Yes** Placing radio collars onnative wildlife, possibly reducing natural predation.

Describe the biophysical effects/benefits of this alternative: implementing this alternative would result in the landing of helicopters in wilderness. The noise and rotor wash from the helicopters would adversely affect refuge wildlife and soils. This alternative could also result in artificial depression of the refuge mountain lion population, should predator control be implemented.

Describe the social recreational benefits: observing or hearing low altitude operation and land of helicopters in the refuge wilderness would greatly compromise the wilderness recreational visitor. Similarly the possibility of conflicts between recreational visitors and mountain lion removal personnel exists. The likelihood of such conflict however is low due to very low levels of backcountry visitation at the refuge.

Describe the societal/political effects/benefits: predator control, as proposed, is a controversial practice. Groups and individuals opposed to lethal control would be adversely affected should predator control be implemented under this alternative.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 2. Occasional use and landing of helicopters in wilderness, while more intrusive than the placement of traps, is preferred due to its greater effectiveness in obtaining a sample of the refuge mountain lion population.

What are the maintenance requirements? No additional maintenance would be required.

What standards and designs will apply? None

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? None.

Action 16: Meteorological, vegetation, and wilderness impact monitoring

In 1999 the refuge initiated a program of annually surveying 25 pairs of plots in wilderness, one of each pair adjacent to a non-wilderness access road or administrative trail, the other in similar habitat more distant from any road or trail, for a variety of impacts. In 2002 the refuge established vegetation transects in various plant communities. Annual monitoring of these stations, plots and transects will provide a record of long-term changes in wilderness conditions on the refuge, both background changes caused by outside factors such a climate and local effects caused by on-site uses.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** – monitoring within wilderness is necessary to detect changes in wilderness conditions.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **Yes Why/How?** Monitoring will provide valuable information about the physical and biological condition of the refuge wilderness.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** This long-term monitoring is designed specifically to identify, and facilitate response to, long-term trends of wilderness impact.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How? T**he issue is collection of appropriate data.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (three of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge staff access study plots and vegetation transects on foot from the nearest non-wilderness access point.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: no direct biophysical effects; this alternative serves to gather data.

Describe the social recreational benefits: None
Describe the societal/political effects/benefits: None.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

Alternative 1 is the only alternative examined, as it is fully compliant with the Wilderness Act of 1964 and satisfies the refuge's data needs.

What are the maintenance requirements? No facilities will be maintained in wilderness.

What standards and designs will apply? Only survey/monitoring protocols will apply. These affect the execution of fieldwork, not wilderness features.

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will maintain survey/monitoring records.

Action 17: Exotic/invasive species control

Several plant species not native to the refuge have the potential to become established at infestation levels. Control of such infestations is necessary to prevent degradation of habitat and ecological communities on the refuge.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** – the exotic/invasive species must be controlled where they occur.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **Possibly** – the extent of infestations does not currently constitute an unnatural condition in the refuge wilderness, but the infestations could expand to create unnatural plant composition over large areas in the absence of control actions.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **Yes. Why/How?** Controlling invasive species will protect natural processes in wilderness.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes Why/How?** Conversion of natural habitats by invading exotic species degrades the natural character of wilderness areas over time. Control of exotic/invasive species should help to preserve the natural character of the wilderness for future generations.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes Why/How?** The issue is ecological community protection.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (three of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge staff will be trained to recognize all exotic plants that have the potential of becoming infested on the refuge. During regular refuge management activities the staff will note the locations of all such species observed. Newly identified small clumps of fountain grass will be removed by hand pulling to contain its spread. Any access to wilderness specifically focused on invasive species control or survey will be on foot from a non-wilderness access point.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: some reduction of the spread of fountain grass, but primarily collection of data.

Describe the social recreational benefits: None

Describe the societal/political effects/benefits: None.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

Alternative 1 is the only alternative examined, as it is fully compliant with the Wilderness Act of 1964 and satisfies the refuge's data needs.

What are the maintenance requirements? No facilities will be maintained in wilderness.

What standards and designs will apply? Only survey/monitoring protocols will apply. These affect the execution of fieldwork, not wilderness features.

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will maintain survey/monitoring records.

Note: if the refuge determines that infestations of exotic/invasive are sufficiently extensive as to require aggressive control treatments, a control plan will be developed, and subjected to minimum requirements analysis.

Action 18: Abandoned Vehicle Removal

Many motor vehicles are abandoned every year in the refuge wilderness by undocumented aliens or smugglers. The refuge removes the vehicles as quickly as possible after they are found.

Minimum Requirements Questions

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** – the vehicles in question are in wilderness.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **Yes, Why/how?** The abandoned vehicles are very visually jarring in the wilderness. Encountering an abandoned vehicle in wilderness would adversely affect a visitor's experience of wilderness.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **Yes Why/How**? Vehicles will remain in the refuge wilderness.
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **Yes Why/How?** The presence of abandoned vehicles adversely affects several elements of wilderness character.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes**. **Why/How?** Vehicles not removed would remain in the wilderness for many years.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes. Why/How?** The issue addresses a direct impact to wilderness.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (five of six questions above answered "yes") it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge staff will tow the vehicle to the nearest non-wilderness road, typically El Camino del Diablo, using a refuge vehicle. Whenever feasible, the vehicle will be towed along its entry track, thus avoiding new impacts to wilderness. Once removed to a road outside of wilderness, a commercial towing company will haul the vehicle off of the refuge. The refuge will also examine the feasibility entering a memorandum of agreement with adjacent military commands to make heavy-lift military helicopters available for removing abandoned vehicles from refuge wilderness.

Does this alternative involve:

Use of temporary road?	**Yes** (in some cases the vehicle will be towed along administrative trails, as unauthorized vehicles often use them)
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**Potentially** (only if an agreement with the Military is reached)
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: some new rutting could occur during vehicle removal.

Describe the social recreational benefits: while witnessing actual removal operations would disturb a visitor's wilderness experience, the overall result of removing abandoned vehicles would be enhancement of the recreational value of the wilderness.

Describe the societal/political effects/benefits: None.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Alternative 2

Refuge staff will tow the vehicle to the nearest non-wilderness road, typically El Camino del Diablo, using draft horses or oxen. The draft animals will be hauled to nearest non-wilderness access point in a stock trailer and then led to location of the abandoned vehicle by the shortest route. The vehicle would be towed out of the wilderness along its entry track, if feasible, to avoid new impacts to wilderness. Once removed to a road outside of wilderness, a commercial towing company will haul the vehicle off of the refuge.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: some new rutting could occur during vehicle removal.

Describe the social recreational benefits: the overall result of removing abandoned vehicles would be enhancement of the recreational value of the wilderness.

Describe the societal/political effects/benefits: None.

Describe health and safety and concerns/benefits: trailering stock along non-wilderness access roads could lead to some problems with the tow vehicles and trailers becoming stuck due to the poor condition of those roads.

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: this alternative would use traditional methods consistent with the pre-industrial period.

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 1. The overall efficiency and reliability of this alternative recommends it.

What are the maintenance requirements? No facilities will be maintained in wilderness.

What standards and designs will apply? None.

Develop and describe any mitigation measures that apply: the tow vehicle will be operated at low speed. If the abandoned vehicle has functional steering, it will be steered while in tow to limit any travel beyond the area already disturbed.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will maintain records of vehicles removed.

Note: if the refuge enters a memorandum of agreement with the military to use heavy-lift helicopters to remove abandoned vehicles, a separate analysis will be completed.

Action 19: Military debris removal

The primary military debris issue on the refuge is the presence of up to 1,600 old aerial gunnery tow darts scattered throughout the wilderness. These are wood and aluminum structures approximately 4 meters (13 feet) long with a cement weight. They were formerly towed behind aircraft and used as targets for air-to-air gunnery. Tow darts are an unnatural element in the refuge that can be highly visible when reflecting sunlight, and tow cable can entangle wildlife.

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** – the debris in question is in wilderness.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **Yes, Why/how?** The old tow darts are very visually jarring in the wilderness. Encountering one in wilderness would adversely affect a visitor's experience.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **Yes Why/How**? Modern artifacts will remain in the refuge wilderness.
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **Yes Why/How?** The presence of military debris adversely affects several elements of wilderness character.
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes**. **Why/How?** Debris not removed would remain in the wilderness for many years.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes**. **Why/How?** The issue addresses a direct impact to wilderness.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (five of six questions above answered "yes") it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge staff and volunteers will walk to the tow dart or tow cable, cut it into manageable pieces with hand tools and carry the pieces out of the wilderness. The cement weights from the nose of each dart would be left in an inconspicuous location, as they are too heavy to carry for any great distance (greater than 75 kilograms [165 pounds]).

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative would remove tow cable, which may cause injury to wildlife.

Describe the social recreational benefits: implementing this alternative would remove evidence of modern military use of the wilderness.

Describe the societal/political effects/benefits: None.

Describe health and safety and concerns/benefits: removal would occur during cool times of the year to limit stress on personnel.

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: None

Alternative 2

Refuge staff and volunteers will use a truck to haul tow darts out of the wilderness. The route to each tow dart will be planned to require the minimum distance driven on administrative trails or wilderness soil.

Does this alternative involve:

Use of temporary road?	**Yes**
Use of motor vehicles?	**Yes**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative would result in soil disturbance and vehicle tracks in previously pristine areas.

Describe the social recreational benefits: implementing this alternative would remove tow darts and tow cable, which presently cause adverse effects to wilderness recreation visitors.

Describe the societal/political effects/benefits: the proposed use of vehicles in wilderness beyond the limits of administrative trails would adversely affect groups and individuals who value wilderness.

Describe health and safety and concerns/benefits: None.

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: none.

Alternative 3

Refuge staff and volunteers will access the tow dart or tow cable, using a horse-drawn wagon. Tow darts and cable will be loaded onto the wagon and hauled out of wilderness for disposal.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**Yes**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: implementing this alternative would create some wheel ruts in previously pristine areas of the refuge. This alternative would also remove tow cable, which may cause injury to some wildlife.

Describe the social recreational benefits: implementing this alternative would remove evidence of modern military use of the wilderness.

Describe the societal/political effects/benefits: None.

Describe health and safety and concerns/benefits: removal would occur during cool times of the year to limit stress on personnel.

Describe economic and timing considerations/benefits: implementing this alternative would require obtaining draft horses and a suitable wagon.

Describe heritage resource considerations/benefits: None

Sheet 4: Selection of Minimum Tool Alternative

The Selected Alternative is number 1. While this alternative would leave cement dart weights in the wilderness, these are inert and could be moved short distances to sites where they would be inconspicuous.

What are the maintenance requirements? None

What standards and designs will apply? None.

Develop and describe any mitigation measures that apply: None

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? None

Action 20: Cultural resource site reconnaissance and stabilization

The CCP calls for periodic reconnaissance of known cultural resources sites to identify any damage or signs of vandalism. Sites that have become exposed and unstable will be stabilized.

Step 1. Is the action necessary to administer the Wilderness?

1. Is this an emergency? **No**
2. Is this problem/issue subject to valid existing rights, such as access to valid mining claim, state lands, etc.? **No**
3. Can the problem/issue be addressed by administrative actions outside a wilderness area? **No** – the some of the cultural resources sites are in wilderness.
4. Is there a special provision in legislation that allows this project activity? **No.**

Step 1, Continued: does resolving the issue/problem protect wilderness character and values identified in the Wilderness Act.

1. If the issue/problem is not resolved, or action not taken, will the natural processes of the wilderness be adversely affected? **No**.
2. If the issue/problem goes unresolved, or action is not taken, will the values of solitude or primitive and unconfined type of recreation be threatened? **No**.
3. If the issue/problem goes unresolved or action is not taken will evidence of human manipulation, permanent improvements, or human habitation be substantially noticeable? **No**.
4. Does addressing the issue/problem or taking action protect the wilderness as a whole, as opposed to a single resource? **No.**
5. Does addressing this issue/problem or taking action contribute to protection of enduring wilderness for future generations? **Yes**. **Why/How?** Protection and stabilization of cultural resources will conserve the historical value of the wilderness.
6. Is this an issue for reasons other than convenience or cost of administration? **Yes. Why/How?** Federal law and Service policy mandate protecting cultural resources.

Step 1 conclusion: As administering the activity in non-wilderness areas only is not feasible, and the activity will protect some wilderness values (two of six questions above answered “yes”) it is appropriate to administer the activity in wilderness.

Step 2, Determining the Minimum Tool

Identify and describe the range of alternatives, including those that utilize traditional tools and non-motorized and mechanized as well as other methods.

Alternative 1

Refuge staff will reconnoiter each known cultural resource on the refuge once a year to document any signs of deterioration/vandalism. Sites showing excessive erosion will be stabilized using simple practices. All access to sites in wilderness will be on foot and simple hand tools will be used for any needed stabilization.

Does this alternative involve:

Use of temporary road?	**No**
Use of motor vehicles?	**No**
Use of motorized equipment?	**No**
Landing of airplanes?	**No**
Landing of helicopters?	**No**
Use of mechanical transport?	**No**
Creating a structure or installation?	**No**
Other impacts to wilderness character?	**No**

Describe the biophysical effects/benefits of this alternative: None

Describe the social recreational benefits: None

Describe the societal/political effects/benefits: None.

Describe health and safety and concerns/benefits: None

Describe economic and timing considerations/benefits: None

Describe heritage resource considerations/benefits: implementing this alternative would conserve and protect cultural resources.

Sheet 4: Selection of Minimum Tool Alternative

Alternative 1 is the only alternative examined, as it is fully compliant with the Wilderness Act of 1964 and satisfies the refuge's objectives for reconnaissance and stabilization of cultural resources sites.

What are the maintenance requirements? No facilities will be maintained in wilderness.

What standards and designs will apply? Only reconnaissance and stabilization protocols will apply. These affect the execution of fieldwork, not wilderness features.

Develop and describe any mitigation measures that apply: none.

What will be provided for monitoring and feedback to strengthen future efforts and preventative actions to be taken to help in future efforts? The refuge will maintain reconnaissance records.

REFERENCES CITED

Hendee, J. C., and C. P. Dawson. 2002. *Wilderness management: stewardship and protection of resources and values.* Third edition. Fulcrum Publishing, Golden, Colorado.

Leopold, A. 1933. *Game management*. University of Wisconsin Press, Madison, Wisconsin.

Appendix G: Compatibility Determinations for Public Use at the Cabeza Prieta National Wildlife Refuge

Compatibility Determination

Use:
Desert Bighorn Sheep Hunting

Refuge Name:
Cabeza Prieta National Wildlife Refuge

Establishing and Acquisition Authority(ies):
The Cabeza Prieta National Wildlife Refuge was established on January 25, 1939 by Executive Order 8038.

Refuge Purpose(s):

1. The refuge was "reserved and set apart for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources... Provided, however, that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve should be available for livestock..." (Executive Order 8038 January 25, 1939).
2. Enactment of the Arizona Desert Wilderness Act of 1990 designated most of the refuge wilderness and created the supplemental refuge purpose of wilderness protection, in accordance with the Wilderness Act of 1964.
3. In addition to the original refuge purposes and the additional wilderness purpose created by the Arizona Desert Wilderness Act of 1990, several federal policies, regulations, and laws affect refuge management activities. Preeminent among these is the Endangered Species Act of 1973, which mandates protection and recovery of threatened and endangered species.

National Wildlife Refuge System Mission:
The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:
The Cabeza Prieta National Wildlife Refuge, working cooperatively with the Arizona Game and Fish Department (AGFD) has offered a limited public desert bighorn sheep hunt each year since 1967. The refuge and AGFD determine the number of sheep permits to issue each year based on the size of the refuge desert bighorn sheep population. Since the inception of hunting, the number of permits has ranged between one and seven per year. Additionally, the State of Arizona sells one state-wide desert bighorn sheep permit at auction each year. The holder of this permit could hunt on the refuge, but none has yet chosen to do so. The hunt period is the month of December.

Desert bighorn sheep hunters are subject to all refuge visitor restrictions. Hunters typically visit the refuge one to three times prior to the hunt to scout for suitable habitats. All hunters must obtain a special use permit from the refuge. The permit provisions are designed to protect refuge resources through additional restrictions on certain activities.

Arizona Game and Fish Department (AGFD) staff will assist refuge staff in administering the hunt.

Availability of Resources:
Adequate funding and staff are available. Administering the refuge desert bighorn sheep hunt does not require any developed facilities on the refuge.

Anticipated Impacts of the Use:
The desert bighorn sheep hunt program should not cause any direct impacts to the refuge other than actual removal of the sheep taken. As discussed in Section 4.2.3.3 of the Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement for Cabeza Prieta National Wildlife Refuge, impacts to refuge desert bighorn sheep population should be considered non-significant. The small number of hunt permits issued each year is based on the present refuge desert bighorn sheep population and is designed to avoid adversely affecting population viability. Additionally, the individual sheep taken should be high aged males near the end of their breeding productivity. As such, they are considered excess animals in the population.

Public Review and Comment:
This compatibility determination was available for public review and comment with the Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement for Cabeza Prieta National Wildlife Refuge from March 16 to August 15, 2005. Some reviewers were opposed to desert bighorn hunting, while others requested additional hunts and fewer restrictions on access for hunting.

Determination (check one below):
___ Use is Not Compatible
X Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
None.

Justification:
Desert bighorn hunting is a traditional, wildlife-dependent public use of the refuge lands. Such uses are generally assumed to be compatible with refuge purposes unless specific conditions exist that render them problematic.

Signature: Refuge Manager Roger DiBrosa 6/6/06
(Signature and Date)

Action
Concurrence: Regional Chief Daryl P. Montoya 6/15/06
(Signature and Date)

Mandatory 15-year Re-Evaluation Date: June 2021

Compatibility Determination

Use:
Concessions by Authorized Agents to provide trips onto the refuge in support of Wildlife Observation and Environmental Interpretation

Refuge Name:
Cabeza Prieta National Wildlife Refuge

Establishing and Acquisition Authority(ies):
The Cabeza Prieta National Wildlife Refuge was established on January 25, 1939 by Executive Order 8038.

Refuge Purpose(s):
1. The refuge was "reserved and set apart for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources... Provided, however, that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve should be available for livestock..." (Executive Order 8038 January 25, 1939).
2. Enactment of the Arizona Desert Wilderness Act of 1990 designated most of the refuge wilderness and created the supplemental refuge purpose of wilderness protection, in accordance with the Wilderness Act of 1964.
3. In addition to the original refuge purposes and the additional wilderness purpose created by the Arizona Desert Wilderness Act of 1990, several federal policies, regulations, and laws affect refuge management activities. Preeminent among these is the Endangered Species Act of 1973, which mandates protection and recovery of threatened and endangered species.

National Wildlife Refuge System Mission:
The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:
Concessionaires would provide trips to the Watchable Wildlife Site on Childs Mountain and potential other trips along the refuge public access roads. All such trips would be coordinated with refuge staff to provide the number of vehicles and individuals, the duration, and the route to be covered. Concessionaires would be agents authorized by the refuge, would obey all refuge visitor restrictions and would be responsible for assuring that tour participants obey such restrictions.

Availability of Resources:
Adequate funding and staff are available. Administering these Concessionaires does not require any developed facilities on the refuge.

Anticipated Impacts of the Use:
Wildlife may be temporarily disturbed by tour groups or could possibly avoid some areas used repeatedly by groups.

Public Review and Comment:

This compatibility determination was available for public review and comment with the Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement for Cabeza Prieta National Wildlife Refuge from March 16 to August 15, 2005. There were no substantive public comments regarding this use.

Determination (check one below):

___ Use is Not Compatible

X Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. Vehicles will drive within the designated travel surface and park within the center 100 feet of designated refuge non-wilderness public access roads.
2. No vegetation will be cut or any roads/trails established.
3. Wildlife Observation/Environmental Interpretation trips will comply with all refuge regulations.
4. A special use permit will be required by all concessionaires conducting Wildlife Observation/Environmental Interpretation Trips, and an appropriate fee may be levied for commercial agents.

Justification:

Trips on the refuge led by concessionaires will support both wildlife observation and environmental interpretation. These are priority public uses of National Wildlife Refuges.

Signature: Refuge Manager _____ 6/6/06
(Signature and Date)

Concurrence: Regional Chief (Acting) _____ 6/15/06
(Signature and Date)

Mandatory 15-year Re-Evaluation Date: June 2021

Compatibility Determination

Use:
Environmental Education, Non-staff Conducted

Refuge Name:
Cabeza Prieta National Wildlife Refuge

Establishing and Acquisition Authority(ies):
The Cabeza Prieta National Wildlife Refuge was established on January 25, 1939 by Executive Order 8038.

Refuge Purpose(s):

1. The refuge was "reserved and set apart for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources... Provided, however, that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve should be available for livestock..." (Executive Order 8038 January 25, 1939).
2. Enactment of the Arizona Desert Wilderness Act of 1990 designated most of the refuge wilderness and created the supplemental refuge purpose of wilderness protection, in accordance with the Wilderness Act of 1964.
3. In addition to the original refuge purposes and the additional wilderness purpose created by the Arizona Desert Wilderness Act of 1990, several federal policies, regulations, and laws affect refuge management activities. Preeminent among these is the Endangered Species Act of 1973, which mandates protection and recovery of threatened and endangered species.

National Wildlife Refuge System Mission:
The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:
Teachers or other group leaders (Boy Scouts, other non-profit groups) would lead field trips on the refuge for the purpose of environmental education.

Availability of Resources:
Adequate funding and staff are available. Administering educational field trips does not require any developed facilities on the refuge.

Anticipated Impacts of the Use:
Wildlife may be temporarily disturbed by environmental education groups or could possibly avoid some areas used repeatedly by the groups, should groups make repeated field trips.

Public Review and Comment:
This compatibility determination was available for public review and comment with the Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement for Cabeza Prieta National Wildlife Refuge from March 16 to August 15, 2005. There were no substantive pubic comments regarding this use.

Determination (check one below):
___ Use is Not Compatible
X Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
1. Vehicles will drive within the designated travel surface and park within the center 100 feet, of designated refuge non-wilderness public access roads
2. No vegetation will be cut or any roads/trails established.
3. Environmental education groups will comply with all refuge regulations.
4. A special use permit will be required by all group leaders.

Justification:
Allowing priority non-staff led environmental education groups on the refuge would increase the provision of environmental education, a wildlife dependent public use of National Wildlife Refuges.

Signature: Refuge Manager _____ 6/6/06
(Signature and Date)

Concurrence: Acting Regional Chief _____ 6/15/06
(Signature and Date)

Mandatory 15-year Re-Evaluation Date: June 2021

Compatibility Determination

Use:
Recreational use of pack and saddle stock

Refuge Name:
Cabeza Prieta National Wildlife Refuge

Establishing and Acquisition Authority(ies):
The Cabeza Prieta National Wildlife Refuge was established on January 25, 1939 by Executive Order 8038.

Refuge Purpose(s):
1. The refuge was "reserved and set apart for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources... Provided, however, that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve should be available for livestock..." (Executive Order 8038 January 25, 1939).
2. Enactment of the Arizona Desert Wilderness Act of 1990 designated most of the refuge wilderness and created the supplemental refuge purpose of wilderness protection, in accordance with the Wilderness Act of 1964.
3. In addition to the original refuge purposes and the additional wilderness purpose created by the Arizona Desert Wilderness Act of 1990, several federal policies, regulations, and laws affect refuge management activities. Preeminent among these is the Endangered Species Act of 1973, which mandates protection and recovery of threatened and endangered species.

National Wildlife Refuge System Mission:
The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:
Use of horses and other pack/saddle stock in the refuge for recreation or in support of other uses (e.g., hunting, wildlife observation, wildlife photography).

Availability of Resources:
Adequate funding and staff are available to administer limited stock use. Large parties or frequent use would require larger staging areas and horse trailer parking areas.

Anticipated Impacts of the Use:
Soil disturbance would occur, particularly in areas where stock is tethered. Manure has the potential of introducing exotic species through viable seeds from fodder, although this impact can be mitigated by using pelletized feeds. Damage to trees and other vegetation from tethering, browsing and trampling would be likely to occur.

Public Review and Comment:
This compatibility determination was available for public review and comment with the Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement for Cabeza Prieta National Wildlife Refuge from March 16 to August 15, 2005. Some reviewers opposed use of pack and saddle stock on the refuge as likely to cause spread of exotic weeds or damage fragile soils.

Determination (check one below):
___ Use is Not Compatible
X Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
This activity must be restricted on a case-by-case basis through issuance of special use permit. Such permits should include stipulations such as requiring pelletized feed 3-days prior to refuge entry and while in the refuge, limitations to party size and number of pack/saddle animals, travel restricted to arroyo bottoms and the bases of bajadas, restoration of areas where stock has been tethered, and others, as determined necessary for each case.

Justification:
The use of pack and saddle stock is well established in units of the Federal Wilderness Preservation System. Due to the fragility of refuge soils and vegetation, however Special Use Permits are necessary to closely regulate this use.

Signature: Refuge Manager Roger DiRosa 6/6/06
(Signature and Date)

Concurrence: Acting Regional ~~Chief~~ Gary P. Montoya 6/15/06
(Signature and Date)

Mandatory 15-year Re-Evaluation Date: June 2021

Compatibility Determination

Use:
Outdoor Recreation – Hiking and Backpacking

Refuge Name:
Cabeza Prieta National Wildlife Refuge

Establishing and Acquisition Authority(ies):
The Cabeza Prieta National Wildlife Refuge was established on January 25, 1939 by Executive Order 8038.

Refuge Purpose(s):
1. The refuge was "reserved and set apart for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources... Provided, however, that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve should be available for livestock..." (Executive Order 8038 January 25, 1939).
2. Enactment of the Arizona Desert Wilderness Act of 1990 designated most of the refuge wilderness and created the supplemental refuge purpose of wilderness protection, in accordance with the Wilderness Act of 1964.
3. In addition to the original refuge purposes and the additional wilderness purpose created by the Arizona Desert Wilderness Act of 1990, several federal policies, regulations, and laws affect refuge management activities. Preeminent among these is the Endangered Species Act of 1973, which mandates protection and recovery of threatened and endangered species.

National Wildlife Refuge System Mission:
The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:
Hikers and overnight backpackers would be provided refuge access for personal enjoyment and exercise. Activity includes meal preparation and camping. Hiking and camping on the refuge may or may not be associated with wildlife dependent public uses such as wildlife observation, photography and hunting.

Availability of Resources:
Administering the hiking and backpacking on the refuge requires approximately 2 FTEs, currently met by a combination of staff and volunteer labor. Costs for postage, telephone and facsimile transmissions are approximately $6,000 per year. Costs for duplicating brochures are approximately $3000 per year.

Anticipated Impacts of the Use:
Some soil and vegetation disturbance is likely to occur from hikers and backpackers. This should be somewhat mitigated by distribution of Leave-No-Trace information to all permitted hikers and backpackers.

Public Review and Comment:
This compatibility determination was available for public review and comment with the Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement for Cabeza Prieta National Wildlife Refuge from March 16 to August 15, 2005. Some reviewers were opposed to a proposed prohibition of wood gathering for fires by backpackers camping in the refuge backcountry. Upon discussion among refuge staff, this restriction was waived.

Determination (check one below):
___ Use is Not Compatible
X Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
All participants in the activity will be provided with information about Leave-No-Trace techniques of wilderness travel and camping. Arizona law prohibits camping within one quarter mile of any developed wildlife water source. As described in the refuge EIS/CCP, refuge staff will continue to monitor visitor and management use impacts to refuge wilderness. Should unacceptable levels of impact be detected, the use may be restricted.

Justification:
Given the large, inaccessible nature of the refuge and the nocturnal, evening or early morning periods of activity of many desert wildlife species, hiking and backpacking are necessary to support wildlife observation and photography.

Signature: Refuge Manager Roger DiRosa 6/6/06
(Signature and Date)

Concurrence: Acting Regional Chief Gary P. Montoya 6/15/06
(Signature and Date)

Mandatory 15-year Re-Evaluation Date: June 2021

Compatibility Determination

Use:
Wildlife Observation

Refuge Name:
Cabeza Prieta National Wildlife Refuge

Establishing and Acquisition Authority(ies):
The Cabeza Prieta National Wildlife Refuge was established on January 25, 1939 by Executive Order 8038.

Refuge Purpose(s):

1. The refuge was "reserved and set apart for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources... Provided, however, that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve should be available for livestock..." (Executive Order 8038 January 25, 1939).
2. Enactment of the Arizona Desert Wilderness Act of 1990 designated most of the refuge wilderness and created the supplemental refuge purpose of wilderness protection, in accordance with the Wilderness Act of 1964.
3. In addition to the original refuge purposes and the additional wilderness purpose created by the Arizona Desert Wilderness Act of 1990, several federal policies, regulations, and laws affect refuge management activities. Preeminent among these is the Endangered Species Act of 1973, which mandates protection and recovery of threatened and endangered species.

National Wildlife Refuge System Mission:
The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:
Individuals enter the refuge under regulated circumstances to observe both flora and fauna via foot access, motor vehicles, and aircraft. This activity includes camping and meal preparation.

Availability of Resources:
Administering wildlife observation on the refuge requires approximately 2 FTEs, currently met by a combination of staff and volunteer labor. Costs for postage, telephone and facsimile transmissions are approximately $6,000 per year. Costs for duplicating brochures are approximately $3000 per year.

Anticipated Impacts of the Use:
Impacts despite reasonable regulations would include disturbance of wildlife, and potential for wildlife avoidance of some areas (varies with species and circumstances).

Public Review and Comment:
This compatibility determination was available for public review and comment with the Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement for Cabeza Prieta National Wildlife Refuge from March 16 to August 15, 2005. There were no substantive comments regarding this use.

Determination (check one below):
___ Use is Not Compatible
X Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
All participants in the activity will be provided with information about Leave-No-Trace techniques of wilderness travel and camping. Arizona law prohibits camping within one quarter mile of any developed wildlife water source. Any participants wishing to use and/or construct an observation blind beyond personal camouflage and natural terrain features must obtain approval from the refuge. Any use of horses or other pack/saddle stock on the refuge requires issuance of a special use permit.

Justification:
Wildlife observation is a priority, wildlife dependent public use of the refuge. Appropriately regulated, it is fully compatible with the refuge purposes.

Signature: Refuge Manager Roger DiRosa 6/6/06
(Signature and Date)

Concurrence: Regional ~~Chief~~ Acting Gary P. Montoya 6/15/06
(Signature and Date)

Mandatory 15-year Re-Evaluation Date: June 2021

Compatibility Determination

Use:
Wildlife Photography

Refuge Name:
Cabeza Prieta National Wildlife Refuge

Establishing and Acquisition Authority(ies):
The Cabeza Prieta National Wildlife Refuge was established on January 25, 1939 by Executive Order 8038.

Refuge Purpose(s):

1. The refuge was "reserved and set apart for the conservation and development of natural wildlife resources, and for the protection and improvement of public grazing lands and natural forage resources... Provided, however, that all the forage resources in excess of that required to maintain a balanced wildlife population within this range or preserve should be available for livestock..." (Executive Order 8038 January 25, 1939).
2. Enactment of the Arizona Desert Wilderness Act of 1990 designated most of the refuge wilderness and created the supplemental refuge purpose of wilderness protection, in accordance with the Wilderness Act of 1964.
3. In addition to the original refuge purposes and the additional wilderness purpose created by the Arizona Desert Wilderness Act of 1990, several federal policies, regulations, and laws affect refuge management activities. Preeminent among these is the Endangered Species Act of 1973, which mandates protection and recovery of threatened and endangered species.

National Wildlife Refuge System Mission:
The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:
Individuals enter the refuge under regulated circumstances to photograph both flora and fauna via foot access, motor vehicles, and aircraft. This activity includes camping and meal preparation.

Availability of Resources:
Administering wildlife observation on the refuge requires approximately 2 FTEs, currently met by a combination of staff and volunteer labor. Costs for postage, telephone and facsimile transmissions are approximately $6,000 per year. Costs for duplicating brochures are approximately $3000 per year.

Anticipated Impacts of the Use:
Impacts despite reasonable regulations would include disturbance of wildlife, and potential for wildlife avoidance of some areas (varies with species and circumstances).

Public Review and Comment:
This compatibility determination was available for public review and comment with the Comprehensive Conservation Plan, Wilderness Stewardship Plan and Environmental Impact Statement for Cabeza Prieta National Wildlife Refuge from March 16 to August 15, 2005. There were no substantive comments regarding this use.

Determination (check one below):
___ Use is Not Compatible
X Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:
All participants in the activity will be provided with information about Leave-No-Trace techniques of wilderness travel and camping. Arizona law prohibits camping within one quarter mile of any developed wildlife water source. Any participants wishing to use and/or construct a photography blind beyond personal camouflage and natural terrain features must obtain approval from the refuge. Any use of horses or other pack/saddle stock on the refuge requires issuance of a special use permit.

Justification:
Wildlife photography is a priority, wildlife dependent public use of the refuge. Appropriately regulated, it is fully compatible with the refuge purposes.

Signature: Refuge Manager Roger DiRosa 6/6/06
(Signature and Date)

Concurrence: Acting Regional Chief Gary P. Montoya 6/15/06
(Signature and Date)

Mandatory 15-year Re-Evaluation Date: June 2021

Appendix H: Bird Species Present at Cabeza Prieta National Wildlife Refuge

The following list includes species observed within or directly adjacent to the refuge boundary. Most of the species listed are migratory, passing through Cabeza Prieta in spring and fall. “Spring” and “fall” do not coincide with traditional calendar seasons, however, because some birds begin spring migrations in late February and fall migrations may start in late July.

Symbols used in this list are defined as follows:

Sp Spring March - May
Su Summer June - July
F Fall August - November
W Winter December - February
a Abundant -- common species, very numerous
c Common -- certain to be seen in suitable habitats
u Uncommon -- present, not certain to be seen
o Occasional -- seen few times during the season
r Rare -- seen at intervals of 2 to 5 years
x Accidental -- seen only once or twice.
* Nesting Species

The hypothetical birds have not been seen within the refuge boundary, but there are records from nearby areas, such as Ajo and Organ Pipe Cactus National Monument

Common/taxonomic Name	Sp	Su	F	W
Grebes				
Pied-billed Grebe/*Podilymbus podiceps*			r	
Eared Grebe/*Podiceps nigricollis*	x		r	x
Pelicans				
American White Pelican/*Pelecanus erythrorhynchos*		x		
Brown Pelican/*Pelecanus occidentalis*		hypothetical		
Frigatebirds				
Magnificent Frigatebird/ *Fregata magnificens*	x			
Bitterns and Herons				
Great Blue Heron/*Ardea herodias*	x		r	
Great Egret/*Casmerodius albus*	o			
Snowy Egret/*Egretta thula*r		r		
Green Heron/*Butorides striatus*			x	
Black-crowned Night-Heron/*Nycticorax nycticora*	x		x	
Storks				
Wood Stork/*Mycteria americana*		x	x	

Common/taxonomic Name	Sp	Su	F	W
New World Vultures				
Black Vulture/*Coragyps atratus*	x		x	
Turkey Vulture/C*athartes aura* *	c	c	c	r
Ducks, Geese, and Swans				
Snow Goose/*Chen caerulescens*			x	
Canada Goose/*Branta canadensis*				x
Gadwall/*Anas strepera*			x	
American Wigeon/*Anas american*	x		o	x
Mallard/*Anas platyrhynchos*				o
Cinnamon Teal/*Anas cyanoptera* l			o	
Northern Shoveler/ *Anas clypeata*			o	o
Northern Pintail/*Anas acuta*			o	
Green-winged Teal/*Anascrecca*			o	r
Redhead/*Aythya americana*	x			
Lesser Scaup/*Aythya affinis*			x	
Bufflehead/*Bucephala albeola*	x		x	
Common Goldeneye/*Bucephala clangula*				x
Common Merganser/*Mergus merganser*				x
Red-breasted Merganser/*Mergus serrator*			x	
Ruddy Duck/*Oxyura jamaicensis*			o	
Hawks, Kites, and Eagles				
Osprey /*Pandion haliaetus*	x			
White-tailed Kite/*Elanus caeruleus*	x	x		
Northern Harrier/*Circus cyaneus*	u		u	c
Sharp-shinned Hawk/*Accipiter striatus*	o		o	o
Cooper's Hawk/*Accipiter cooperii*	u		u	u
Harris' Hawk/*Parabuteo unicinctus* *	r	r	r	r
Swainson's Hawk /*Buteo swainsoni*	r		r	
Red-tailed Hawk/*Buteo jamaicensis* *	c	c	c	c
Ferruginous Hawk/*Buteo regalis*	r			r
Golden Eagle/*Aquila chrysaetos* *	u	u	u	u
Caracaras and Falcons				
Crested Caracara/*Polyborus plancus*	x			
American Kestrel/*Falco sparverius* *	c	u	c	c
Merlin/*Falco columbarius*			x	x
Peregrine Falcon/*Falco peregrinus*			x	x
Prairie Falcon/*Falco mexicanus* *	o	o	o	o
New World Quail				
Gambel's Quail/*Callipepla gambelii* *	c	c	c	c
Rails, Gallinules and Coots				
Virginia Rail/R*allus limicola*			x	
Sora/*Porzana carolina*			x	
American Coot/*Fulica americana*			x	

Common/taxonomic Name	Sp	Su	F	W
Plovers				
Killdeer/*Charadrius vociferus*	x	x	o	x
Stilts and Avocets				
Black-necked Stilt /*Himantopus mexicanus*	x		o	
American Avocet/*Recurvirustra americana*			r	
Sandpipers, Phalaropes, and Allies				
Greater Yellowlegs/*Tringa melanoleuca*	x		o	
Solitary Sandpiper/*Tringa solitaria*	r	r	o	
Willet/*Catoptrophorus semipalmatus*			x	
Spotted Sandpiper/*Actitis macularia*	o		o	
Long-billed Curlew/*Numenius americanus*	x		x	
Western Sandpiper/*Calidris mauri*	r	r	o	
Least Sandpiper/*Calidris minutilla*			o	
Baird's Sandpiper/*Calidris baridii*	x		x	
Pectoral Sandpiper/*Calidris melanotos*			x	
Long-billed Dowitcher/*Limnodromus scolopaceus*	x		x	
Wilson's Snipe/*Gallinago gallinago*			x	x
Wilson's Phalarope/*Phalaropus tricolor*			o	
Gulls and Terns				
Ring-billed Gull/*Larus delawarensis*	r			
Black Tern/*Chidonias niger*			r	
Pigeons and Doves				
Band-tailed Pigeon/*Columba fasciata*	x		x	
White-winged Dove/*Zenaida asiatica* *	c	c	c	
Mourning Dove/*Zenaida macroura* *	c	c	c	c
Inca Dove/*Columbina inca*	hypothetical			
Common Ground-Dove/*Columbina passerina*	x	x	r	
Cuckoos and Roadrunners				
Greater Roadrunner/*Geococcyx californianus* *	u	u	u	u
Barn Owls				
Barn Owl/*Tyto alba*		o	r	r
Typical Owls				
Western Screech-Ow/*Otus kennicottii* *	u	u	u	u
Great Horned Owl/*Bubo virginianus* *	u	u	u	u
Ferruginous Pygmy-Owl/*Glaucidium brasilianum*	x			
Elf Owl/*Micrathene whitneyi* *	c	c	u	
Burrowing Owl/*Athene cunicularia*			r	r
Long-eared Owl/*Asio otus*	r		r	o
Short-eared Owl/*Asio flammeus*			x	x

Common/taxonomic Name	Sp	Su	F	W
Goatsuckers				
Lesser Nighthawk/*Chordeliles acutipennis* *	u	u	u	
Common Poorwill/*Phalaenoptilus nuttallii* *	u	u	u	r
Swifts				
Vaux's Swift/*Chaetura vauxi*	o		o	
White-throated Swift/*Aeronautes saxatalis*	r	r	r	o
Hummingbirds				
Black-chinned Hummingbird/*Archilochus alexandri*	r			
Anna's Hummingbird/*Calypte ana*			x	x
Costa's Hummingbird/*Calypte costae* *	c	o	u	c
Calliope Hummingbird/*Stellula calliope*	r			
Rufous Hummingbird/*Selasphorus rufus*	u		x	
Allen's Hummingbird/*Selasphorus sasin*	x			
Kingfishers				
Belted Kingfisher/*Ceryle alcyon*	x			
Woodpeckers				
Gila Woodpecker/*Melanerpes uropygialis* *	c	c	c	c
Red-naped Sapsucker/*Sphyrapicus nuchalis*	x			
Ladder-backed Woodpecker/*Picoides scalaris* *	u	u	u	u
Gilded Flicker/*Colaptes auratus* *	c	c	c	c
Tyrant Flycatchers				
Olive-sided Flycatcher/*Contopus borealis*	r		r	
Western Wood-Pewee/*Contopus sordidulus*	c		c	
Willow Flycatcher/*Empidonax traillii*	u		u	
Least Flycatcher/*Empidonax virescens*			x	
Hammond's Flycatcher/*Empidonax hammondii*	r		x	
Gray Flycatcher/*Empidonax wrightii*	u		o	x
Dusky Flycatcher/*Empidonax oberholseri*	o		o	
Pacific-slope Flycatcher/*Empidonax difficilis*	u		u	
Black Phoebe/*Sayornis nigricans*	r		r	x
Say's Phoebe/*Sayornis saya* *	c	o	c	c
Vermilion Flycatcher/*Pyrocephalus rubinus*	x			x
Ash-throated Flycatcher/*Myiarchus cinerascens* *	u	u	u	u
Brown-crested Flycatcher/*Myiarcus trannulus* *	o	o		
Tropical Kingbird/*Tyrannus melancholicus*		x		
Western Kingbird/*tyrannus verticalis* *	o		o	

Common/taxonomic Name	Sp	Su	F	W
Shrikes				
Loggerhead Shrike/*Lanius ludovicianus* *	c	u	c	c
Vireos				
Bell's Vireo/*Vireo bellii* *	r	r		
Gray Vireo/*Vireo vicinior*	o		o	o
Yellow-throated Vireo/*Vireo flavifrons*		x		
Plumbeous Vireo/*Vireo huttoni*	o		x	
Warbling Vireo/*Vireo gilvus*	c		c	
Crows and Jays				
Steller's Jay/*Cyanocitta stelleri*			x	
Western Scrub-Jay/ *Aphelocoma coerulescens*			x	x
Pinyon Jay/*Gymnorhinus cyanocephalus*			x	
Clark's Nutcracker/*Nucifraga columbiana*			x	
Common Raven/*Corvus corax* *	c	c	c	c
Larks				
Horned Lark/*Eremophila alpestris* *	o	o	o	o
Swallows				
Purple Martin/*Progne subis*		o	o	
Tree Swallow/*Tachycineta bicolor*	r			
Violet-green Swallow/*Tachycineta thalassina*	u		o	
Northern Rough-winged Swallow/ *Stelgidopteryx serripennis*	r	r	o	
Bank Swallow/*Riparia riparia*			o	
Cliff Swallow/*Hirundo pyrrhonota*	o	o	o	x
Barn Swallow/*Hirundo rustica*	r		o	
Verdins				
Verdin/*Auriparus flaviceps* *	c	c	c	c
Nuthatches				
Red-breasted Nuthatch/*Sitta canadensis*			x	
Wrens				
Cactus Wren /*Campylorhynchus brunneicapillus**	c	c	c	c
Rock Wren/*Salpinctes obsoletus* *	c	u	c	c
Canyon Wren/*Catherpes mexicanus* *	u	u	u	u
Bewick's Wren/*Thryomanes bewickii*			r	u
House Wren/*Troglodytes aedon*	o		o	o
Kinglets				
Golden-crowned Kinglet/*Regulus satrapa*				x
Ruby-crowned Kinglet/*Regulus calendula*	c		c	c

Common/taxonomic Name	Sp	Su	F	W
Gnatcatchers				
Blue-gray Gnatcatcher/*Polioptila caerulea*			x	x
Black-tailed Gnatcatcher/ *Polioptila melanura* *	c	c	c	c
Thrushes				
Western Bluebird/*Sialia mexicana*				r
Mountain Bluebird/*Sialia currucoides*	x		x	o
Townsend's Solitaire/*Myadestes townsendi*	r		r	o
Swainson's Thrush/*Catharus ustulatus*	c		x	
Hermit Thrush/*Catharus guttatus*	u		u	o
American Robin/*Turdus migratorius*	r		r	o
Mockingbirds and Thrashers				
Northern Mockingbird/*Mimus polyglottos* *	c	o	c	c
Sage Thrasher/*Mimus gundlachii*	u		x	u
Bendire's Thrasher/*Toxostoma bendirei* *	o	o	o	
Curve-billed Thrasher/*Toxostoma curvinostre* *	c	c	c	c
Crissal Thrasher/*Toxostoma crissale* *	u	u	u	u
LeConte's Thrasher/*Toxostoma lecontei* *	u	u	u	u
Starlings				
European Starling/*Sturnus vulgaris*				r
Pipits				
American Pipit/*Anthus spinoletta*			o	
Sprague's Pipit/*Anthus sprageuii*				x
Waxwings				
Cedar Waxwing/*Bombycilla cedroum*	x			x
Silky-Flycatchers				
Phainopepla/*Phainopepla nitens* *	c	r	c	c
Wood-Warblers				
Orange-crowned Warbler/*Vermivora celata*	c		c	o
Nashville Warbler/*Vermivora ruficapilla*	c		c	
Lucy's Warbler/*Vermivora luciae* *	u	u		
Yellow Warbler/*Dendroica petechia*	c		c	
Yellow-rumped Warbler/*Dendroica coronata*	c		c	u
Black-throated Gray Warbler/*Dendroica nigrescens*	c		u	r
Townsend's Warbler/*Dendroica townsendi*	c		o	x
Hermit Warbler/*Dendroica occidentalis*	o		r	
Blackpoll Warbler/*Dendroica striata*		x		
American Redstart/*Setophaga ruticilla*			x	
MacGillivray's Warbler/*Oporonis agilis*	c		c	

Common/taxonomic Name	Sp	Su	F	W
Wood Warblers (cont.)				
Common Yellowthroat/*Geothlypis tichas*	o			
Wilson's Warbler/W*ilsonia pusilla*	c		c	
Yellow-breasted Chat/*Icteria virens*	x			
Tanagers				
Summer Tanager/*Piranga rubra*	x		x	
Western Tanager/*Piranga ludoviciana*	c	o	c	
Sparrows				
Green-tailed Towhee/*Pipilo chlorurus*	u		u	u
Spotted Towhee/*Pipilo erythrophtalmus*	r		r	o
Canyon Towhee/*Pipilo alberti* *	r	r	r	r
Cassin's Sparrow/*Aimophila cassinii*			r	
Chipping Sparrow/*Spizella passerina*	u		u	u
Brewer's Sparrow/*Spizella breweri*	c		c	c
Black-chinned Sparrow/*Spizella atrogularis*	r		r	x
Vesper Sparrow/*Pooecetes gramineus*	u		c	c
Lark Sparrow/*Chondestes grammacus*	o	x	u	o
Black-throated Sparrow/*Amphispiza bilineata* *	c	c	c	c
Sage Sparrow/*Amphispiza belli*	u		c	c
Lark Bunting/*Calamospiza melanocorys*	u		u	u
Savannah Sparrow/*Passerculus sandwichensis*			u	o
Grasshopper Sparrow/*Ammodramus savannarum*			r	r
Fox Sparrow/*Passerella iliaca*			r	r
Lincoln's Sparrow/*Melospiza lincolnii*	o		o	o
White-crowned Sparrow/*Zonotrichia leucophrys*	c		c	c
Dark-eyed Junco/*Junco hyemalis*	r		o	u
Chestnut-collared Longspur/*Calcarius ornatus*			r	
Cardinals and Allies				
Northern Cardinal/*Cardinalis cardinalisj*	r		r	r
Pyrrhuloxia/*Cardinalis sinuatus* *	r	r	r	r
Black-headed Grosbeak/*Pheucticus melanocephalus*	c	o	c	
Blue Grosbeak/*Guiraca caerulea*	x	x	x	
Lazuli Bunting/*Passerina amoena*	u		u	
Indigo Bunting/*Passerina cyanea*	o	x		
Varied Bunting/*Passerina versicolor*		r		

Common/taxonomic Name	Sp	Su	F	W
Blackbirds				
Red-winged Blackbird/*Agelaius phoeniceus*	r	r	r	
Western Meadowlark/*Sturnella neglecta* *	o		u	u
Yellow-headed Blackbird/*Xanthocephalus xanthocephalus*	r	r	o	
Rusty Blackbird/*Euphagus carolinus*			x	
Brewer's Blackbird/*Euphagus cyanocephalus*	r		o	
Great-tailed Grackle/*Quiscalus mexicanus*	r		r	
Bronzed Cowbird/*Molothrus aeneus*	r	r		
Brown-headed Cowbird/*Molothrus ater* *	u	o	u	
Hooded Oriole/*Icteus cucullatus* *	u	o	r	x
Bullock's Oriole/*Icterus galbula*	c	u		
Scott's Oriole/*Icterus parisorum* *	c	c		
Finches				
Cassin's Finch/*Carpodacus cassinii*			x	
House Finch/*Carpodacus mexicanus* *	c	c	c	c
Pine Siskin/*Carduelis pinus*	r		r	
Lesser Goldfinch/*Carduelis psaltria* *	o	o	o	o
Lawrence's Goldfinch/*Carduelis lawrencei*	r		r	
American Goldfinch/*Carduelistristis*				o
Old World Sparrow				
House Sparrow/*Passer domesticus*	o		o	r

Appendix I: Mammal Species Present at Cabeza Prieta National Wildlife Refuge

The following list includes mammals whose presence within Cabeza Prieta boundaries has been verified.

Bats
California leaf-nosed bat *(Macrotus californicus)*
[Category 2 candidate species]
Lesser long-nosed bat *(Leptonycteris curasoae verbabuenae)*
[Federally listed endangered species, formerly called Sanborn's long-nosed bat]
California Myotis *(Myotis californicus stephensi)*
Pallid bat *(Antrozous pallidus pallidus)*
Western Pipistrelle *(Pipistrellus hesperus hesperus)*
Townsend's big-eared bat *(Plecotus townsendii)*
(Category 2 candidate species)
Big free-tailed bat *(Tadarida macrotis)*
(Category 2 candidate species)
Big brown bat *(Eptesicus fuscus pallidus)*
Hoary Bat *(Lasiurus cinereus)*
Pocketed Free-tailed Bat (Nyctinomops femorosacca)
Silver-haired Bat *(Lasionycteris noctivagans)*

Rabbits and Hares
Antelope jackrabbit *(Lepus alleni alleni)*
Black-tailed jackrabbit (Lepus californicus eremicus)
Desert cottontail *(Sylvilagus audubonii arizonae)*

Squirrels
Harris antelope squirrel *(Ammospermophilus harrisii)*
Rock squirrel *(Spermophilus variegatus grammurus)*
Round-tailed ground squirrel *(Spermophilus tereticaudus neglectus)*

Pocket Gophers
Botta's pocket gopher, three subspp *(Thomomys bottae growlerensis, T.b. phasma, T.b. pusillus)*

Pocket Mice
Arizona pocket mouse *(Perognathus amplus taylori)*
Bailey pocket mouse *(Perognathus baileyi baileyi)*
Desert pocket mouse *(Perognathus penicillatus pricei)*
Rock pocket mouse *(Perognathus intermedius phasma)*

Kangaroo Rats
Merriam's kangaroo rat *(Dipodomys merriami merriami)*
Desert kangaroo rat *(Dipodomys deserti arizonae)*

Mice and Rats
Cactus mouse *(Peromyscus eremicus eremicus)*
Pinacate cactus mouse *(Peromyscus eremicus papagensis)*
[Category 2 candidate species]
Canyon mouse *(Peromyscus crinitus disparilis)*
Southern grasshopper mouse *(Onychomys torridus torridus)*
White-throated wood rat *(Neotoma albigula mearnsi)*
Desert Woodrat *(Neotoma lepida auripila)*

Doglike and Foxlike Animals
Coyote *(Canis latrans mearnsi)*
Kit fox *(Vulpes macrotis macrotis)*
Gray fox *(Urocyon cinereoargenteus)*

Raccoons and Relatives
Ringtail *(Bassariscus astutus yumanensis)*

Weasels and Relatives
Badger *(Taxidea taxus berlandieri)*
Western spotted Skunk *(Spilogale gracilis leucoparia)*

Cats
Bobcat *(Felis rufus baileyi)*
Mountain Lion *(Felis concolor)*

Peccaries
Collared peccary, or javelina, *(Tayassu tajacu)*

Deer and Relatives
Mule deer *(Odocoileus hemionus crooki)*

Pronghorns
Sonoran pronghorn *(Antilocapra americana sonoriensis)*
[Federally listed endangered species}

Sheep and Relatives
Desert Bighorn *(Ovis canadensis mexicana)*

The following list includes mammals that have been verified near the Refuge and would be expected to be resident or transient, but no verified sightings have been made on the Refuge.

Mexican free-tailed bat *(Tadarida brasiliensis mexicana)*
Underwood's mastiff bat *(Eumops underwoodi)*
[Category 2 candidate species]
Little pocket mouse *(Perognathus longimembris)*
White-tailed deer *(Odocoileus virginianus couesi)*

Appendix J: Amphibian and Reptile Species Present at Cabeza Prieta National Wildlife Refuge

The following list of amphibians and reptiles found on the refuge is considered to be incomplete, but the species listed have been verified to occur on the refuge.

Toads
Couch's Spadefoot Toad *(Scaphiopus couchi)*
Great Plains Toad *(Bufo cognatus)*
Sonoran Green Toad *(Bufo retiformis)*
Sonoran Desert Toad *(Bufo alvarius)*
Red-spotted Toad *(Bufo punctatus)*

Frogs
Canyon Treefrog *(Hyla arenicolor)*

Reptiles

Turtles
Desert Tortoise *(Gopherus agassizi)*

Lizards
Desert Banded Gecko *(Coleonyx variegatus)*
Chuckwalla *(Sauromalus ater)*
Desert Iguana *(Dipsosaurus dorsalis)*
Zebra-tailed Lizard *(Callisaurus draconoides)*
Colorado Desert Fringe-toed Lizard *(Uma notata)*
Collared Lizard *(Crotaphytus collaris)*
Long-nosed Leopard Lizard *(Gambelia wislizenii)*
Desert Spiny Lizard *(Sceloporus magister)*
Long-tailed Brush Lizard *(Urosaurus graciosus)*
Tree Lizard *(Urosaurus ornatus)*
Common Side Blotched Lizard *(Uta stansburiana)*
Desert Horned Lizard *(Phyrnosoma platyrhinos)*
Regal Horned Lizard *(Phrynosoma solare)*
Tiger Whiptail *(Aspidoscelis tigris)*
Sonoran Spotted Whiptail *(Aspidoscelis s sonorae)*
Red-backed Whiptail *(Aspidoscelis burti xanthonotus)*
Gila monster *(Heloderma suspectum)* [venomous]

Snakes
Rosy Boa *(Lichanura trivirgata)*
Spotted Leaf-nosed Snake (*Phyllorhynchus decurtatus)*
Saddled Leaf-nosed Snake *(Phyllorhynchus browni)*
Coachwhip (Red Racer) *(Masticophis flagellum)*
Sonoran Whipsnake *(Masticophis bilineatus)*
Western Patch-nosed Snake *(Salvadora hexalepis)*
Glossy Snake *(Arizona elegans)*
Gophersnake *(Pituophis catenifer)*
California Kingsnake *(Lampropeltis getulus californiae)*
Long-nosed Snake *(Rhinocheilus leconti)*
Western Shovel-nosed Snake *(Chionactis occipitalis)*

Sonoran Lyre Snake *(Trimorphodon biscutatus lambda)*
Nightsnake *(Hypsiglena torquata)*
Arizona Coralsnake *(Micruroides euryxanthus)* [venomous]
Western Diamondback Rattlesnake *(Crotalus atrox)* [venomous]
Speckled Rattlesnake *(Crotalus mitchelli)* [venomous]
Sidewinder *(Crotalus cerastes)* [venomous]
Black-tailed Rattlesnake *(Crotalus molossus)* [venomous]
Tiger Rattlesnake *(Crotalus tigris)* [venomous]
Mojave Rattlesnake *(Crotalus scutulatus)* [venomous]

The following amphibian and reptile species have not been confirmed to exist on the refuge, but are thought to occur there:

Toads
Mexican Spadefoot Toad *(Spea multiplicata)*
SouthwesetrnWoodhouse's Toad *(Bufo woodhousii australis)*

Frogs
Burrowing treefrog *(Pternohyla fodiens).*

Lizards
Lowland Sonoran Spiny Lizard *(Sceloporus clarkii)*
Flat-tailed Horned Lizard *(Phrynosoma mcallii)*
Desert Night Lizard *(Xantusia vigilis)*

Snakes
Blind Snake *(Leptotyphlops humilis)*

Appendix K: Social Impact Analysis Report

CABEZA PRIETA NATIONAL WILDLIFE REFUGE

Social Impact Analysis Report

Prepared for

U.S. Fish and Wildlife Service

Albuquerque, NM

Prepared by

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SECTION ONE: INTRODUCTION

PURPOSE OF THE REPORT:

The purpose of the Cabeza Prieta NWR social impacts analysis report is to evaluate and compare the social effects of current management activities and four proposed management alternatives. These effects focus on how management activities affect visitor experiences but also address potential stakeholder concerns for each management alternative.

Public land managers must have an understanding of visitor and visitation characteristics for their management area so that they can address, to the extent possible, the values and beliefs of those who use the public lands. Consequently, managers can improve relations with the public, gain support, and possibly even improve management practices by developing an understanding of visitors and visitation characteristics.

This report explores the issues of the visitation (overall visitation and repeat visitors) to Cabeza Prieta National Wildlife Refuge (hereafter Cabeza Prieta NWR). By looking at visitors' responses to a variety of recreation questions, we attempt to draw some conclusions about how visitors will perceive changes proposed within Environmental Impact Statement (EIS) alternatives. However, it must be stated that visitors to the refuge are not the only individuals or groups with a legitimate interest in how the refuge is managed. While this report attempts to provide analysis of how management activities will affect the broader public, the only quantitative data available are from a visitor survey. The analysis presented in this report can be supplemented by reports compiled from public meetings, public comments on the DEIS after it is released, and other public input that is received.

Survey Overview and Methods

Overview

The U.S. Fish and Wildlife Service (FWS) is required to develop a Comprehensive Conservation Plan (CCP) for each unit of the National refuge system. The CCP for each refuge must contain an analysis of social and economic conditions, as well as evaluate social and economic results from likely management scenarios. The Cabeza Prieta NWR is unique within the National refuge system because it focuses on the protection of an endangered species of Pronghorn –along with Desert Bighorn Sheep and other flora and fauna—and is located in an extremely arid environment, surrounded by public lands managed by a variety of other agencies and Indian Nations, and a long border with Mexico. Much of the refuge is also officially designated as wilderness. Although visitation at the refuge is small, visitors commonly traverse the refuge along an historic wilderness road that traces the route of early Spanish exploration of the Southwest. The visitor traffic is complicated by the potential for people to employ motorized vehicles in the wilderness areas of the refuge, frequent presence of undocumented aliens seeking entry into the U.S. through the refuge, interest of Native American groups in using the refuge for traditional and religious purposes, hunting for desert bighorn sheep, and cross-boundary management of the endangered Pronghorn population. The refuge manager and regional planning staff of the FWS are responsible for including social and economic assessments in both the CCP and in an Environmental Impact Statement, in such a way that understanding these factors aids planning decisions and helps guide management actions.

Survey Design and Distribution

In the fall of 2000 the Policy Analysis and Science Assistance Program (PASA) of the Fort Collins Science Center (FORT) in the U.S. Geological Survey met with the staff of the Cabeza Prieta NWR to discuss the issues related to social, economic, and human dimensions of natural resource management for the CCP planning process. As a result of this meeting, a combination of studies was designed to evaluate how humans are affected by environmental management decisions and how human activities interact with natural resources management.

In 2002 PASA personnel sent a survey by mail to 1090 individuals who purchased a permit to drive onto Cabeza Prieta NWR. We surveyed all of those who received permits from June 18, 2001 to June 17, 2002, because the number of permit holders was relatively small. The surveys were mailed from and received by the staff at the Fort Collins Science Center. The returned surveys were given an identification number and the data was coded and entered into an SPSS™ database.

The design of the survey instruments and methods for conducting this research closely follows Dillman's Total Design Method (TDM; Dillman 2000). This methodology involves designing a survey that is relatively easy to complete along with written contact information that encourages response by highlighting the importance of study participation and the social utility of the study.

The research team designed the survey for Cabeza Prieta visitors. Refuge staff and CCP planning team members were consulted in the design phase to ensure that the questions reflected conditions and concerns of the refuge. Approval to conduct the survey was obtained through the formal OMB approval process and the OMB control number was displayed on the survey and other written communications.

To administer the survey, a post card was mailed to all potential respondents. The purpose was twofold: to determine the number of "bad addresses" in the mailing list and to inform the potential respondents that the survey was on its way. When postcards were returned as "undeliverable" we removed those addresses from the database, and sent the initial survey and cover letter to all remaining individuals in the study sample. After one week, a postcard was sent to addressees, thanking them for completing the survey or reminding them to do so. Two weeks after the reminder postcard, another survey and cover letter was mailed to subjects who had not returned the completed survey. Four weeks after the reminder postcard, a third copy of the survey and cover letter was sent to individuals who had not completed a survey. Finally, to determine if those who had not responded were different from those who had responded we compared geographic location and month of refuge visit in respondents and non-respondents. We did not any significant differences between the respondents and non-respondents. This methodology has been shown to increase response rates, improve accuracy and reduce costs. The response rate for the survey was 74%. According to Dillman (2000) a response rate of 50% or better is very good for a mail out survey to the general public.

Table 1. Response rate for Cabeza Prieta NWR Visitor survey

Total Addresses	1090
Undeliverable Addresses	162
Respondents	685
Respondent Rate	73.7%

Visitor Background

Data from the survey show that of the 685 respondents, 66% were male, 31% were female, and 3% chose not to respond to the question. The average age of the respondents was 53, with nearly 69% of the respondents reporting their age as 45 or older and 48% reporting their age as 55 or older. Forty-six percent of the respondents had two or more years of college or formal education above high school. Another 38% indicated that they had attended graduate or professional school. Respondents were typically from one of five western states: Arizona, Colorado, New Mexico, California, or Texas. The majority of visitors visited Cabeza Prieta NWR once within the year (see table 2).

Table 2: Number of trips made to Cabeza Prieta NWR

Number of trips (Number of respondents)	Percentage of Visitors
1 (391)	59.0%
2-5 (189)	28.5%
6-10 (28)	4.2%
11-20 (13)	2.0%
More than 20 (42)	6.3%

As Table 2 shows, the majority (59%) of visitors to Cabeza Prieta NWR made one visit between June 2001 and June 2002, while another 28.5% made between two and five trips. At the other end, about 1% of visitors made more than 20 trips to Cabeza Prieta NWR within the year. (For a more complete picture of visitors to Cabeza Prieta NWR, see Ponds and Burkardt 2003.)

It is important to note that the average visitor is different from the repeat visitor. When managing public lands, it is essential to take into account not only the most common visitor, but also those repeat visitors who are often the mainstay for the region. For Cabeza Prieta NWR, local residents are the most likely repeat visitors (Table 3). Because public lands are held in trust for all of the American people, management actions affect not only visitors but also all Americans.

Table 3: Who are the repeat visitors?

Location of Residence	Number of Visits				
	1	2-5	6-10	11-20	>20
Local (Ajo, Why, Yuma) residents	15.0%	50.4%	12.0%	6.8%	4.5%
State residents	62.2%	31.1%	3.1%	0.0%	0.0%
Residents of U.S. states other than Arizona	75.5%	17.0%	1.6%	1.3%	0.0%

Table 3 reveals that locals (residents of Ajo, Why and Yuma) are the most frequent repeat visitors. Visitors from Arizona (but outside of the Ajo, Why, Yuma region) are less likely than locals to be repeat visitors, but more likely than residents of other U.S. states. Finally, residents of U.S. states other than Arizona are the least likely to be repeat visitors.

Public uses of refuges

The Refuge Management Improvement Act of 1997 directed refuges to place specific human activities above others, provided the uses could be determined appropriate, and compatible with refuge purposes. These activities are environmental education; interpretation; hunting; fishing; wildlife observation, and nature photography. Cabeza Prieta NWR offers five of these six activities (fishing is not a refuge activity). We designed our survey to ask for responses about the importance of each of these activities.

Survey respondents were asked about the importance of various refuge activities for their decision to visit Cabeza Prieta NWR. When asked to rate, on a scale of one to four, the importance of activities for the decision to make a trip to Cabeza Prieta NWR, the activity most likely to be rated as important (the activity with the highest mean score) was viewing scenery. The activity least likely to be rated important was horseback riding. Overall, six activities were rated as

important (mean score above 3), nine were rated as somewhat important (mean score between 2 and 3), and two were rated as not important (mean score less than 2). See Table 4.

Table 4: Importance of Activities for Recreation Trip to Cabeza Prieta NWR

Important (mean score over 3)	Viewing Scenery
	Seeking Wilderness Solitude
	Viewing Night Skies
	Viewing Rare Wildlife
	Hiking in the Backcountry
	Viewing Other Wildlife
Somewhat Important (mean score between 2 and 3)	Viewing Historic or Heritage Sites
	Camping in the Backcountry
	Wildlife Photography Opportunities
	Camping in the Front-country
	Bird-watching
	Environmental Education
	Hiking in the Front-country
	Environmental Interpretation
	Biking/ Mountain biking
Not Important (mean score less than 2)	Hunting Bighorn Sheep
	Horseback riding

A management alternative that changes the availability of the top six activities (viewing scenery, seeking solitude, viewing night skies, viewing rare wildlife, hiking in the backcountry, and viewing other wildlife) will have a negative impact on refuge visitors. On the other hand, an activity such as hunting bighorn sheep is very important to a small number of visitors (27 respondents, nearly 4% rated bighorn sheep hunting as "very important") and has been determined to be a compatible refuge activity for Cabeza Prieta NWR.

In the following chapter of this report, we address the social effects of the five DEIS alternatives. The five alternatives are:

- Alternative 1: No-action alternative (current management)
- Alternative 2: Minimum intervention
- Alternative 3: Restrained intervention
- Alternative 4: Active management (preferred action)
- Alternative 5: Maximum effort

To assess the social impacts of each alternative we used several data sources. First was the visitor survey, described above. Because the survey responses provided data about how visitors perceive the refuge and refuge management, this was used as the baseline. Under a no-action alternative, visitor use and satisfaction with the refuge could be expected to stay at very similar levels.

For each alternative, refuge managers estimated the number of projected visitor-days. Table 5 shows expected refuge use levels by alternative.

Table 5: Anticipated number of visitor days by alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Recreation visits	7806	7771	7771	8231	8656
Big game hunting	240	0	85-240	265	265
Total	**8046**	**7771**	**7856-8011**	**8496**	**8921**

The difference in expected recreation visits across alternatives is small. The largest projected difference is from Alternative 1 to Alternative 5 with an increase of 850 visitor days. Therefore, quantitatively assessing the effects of the proposed alternatives is of limited utility. What is important, in terms of visitor experience, is that increasing one kind of use (for example, opening access to off-street vehicles) will affect the recreation experience of another use (for example, wildlife observation). In addition to survey results, we used peer-reviewed research results in the topic areas of recreation, wilderness experience, public attitudes about hunting, predator management, and others to describe potential impacts of the management alternatives.

Much of the research on non-monetary values of wilderness areas and wildlife presents the argument that these amenities have value that cannot be measured in dollars. In fact, some state that these resources have existence value that accrues to all of society, not only those who "use" the resources. Viewed in this way, one can argue that the resources of an individual wildlife refuge hold value for all of society, and that protecting these resources provides a broad social benefit. Again, this value is difficult to quantify but should not be ignored in the decision making process.

Environmental philosophers have argued that forestry management must embrace values that are beyond traditional production values. Included in this list of values provided by forests are life support values, economic values, scientific values, recreational values, aesthetic values, wildlife values, biotic diversity values, natural history values, and intrinsic values (Holmes and Coufal 1991). These values are provided by other natural resources including national wildlife refuges, wilderness areas, and other public lands.

Numbers of hunting days varies across alternatives from 0 to 265. The economic value of hunting for the regional economy is analyzed in the Economic Analysis Report prepared by Caughlan. Numbers of hunters under each alternative are relatively small, but the presence or absence of hunting on the refuge is of high importance to groups with strong opinions about whether hunting should occur on the refuge. Some who do not have the opportunity to hunt value the existence benefit of the hunting program. Decisions about hunting are complex, but will be important to many in this decision process.

Survey respondents strongly stated that experiencing wilderness solitude was a highly valued part of their trip to Cabeza Prieta. Although there is some variability in how individuals define solitude, the ability to provide these experiences to visitors is a strong indicator of the social impact of each alternative. Respondents also indicated that wildlife viewing was a highly important activity during their visit. The degree to which each alternative continues to provide wildlife viewing opportunities will also be an essential component of this impact analysis.

SECTION TWO: EVALUATION OF ALTERNATIVES

2.0 MANAGEMENT ALTERNATIVES

2. 1 ELEMENTS COMMON TO ALTERNATIVES

Certain elements of endangered and threatened species recovery, wilderness stewardship, and cultural resources management are common to all action alternatives (Alternatives 2 through 5). Some of the alternatives include additional actions beyond the common elements. In all such cases the additional actions are described under the appropriate resource area for the individual alternative.

2.1.1 Endangered and Threatened Species

The presence of endangered and threatened species provides benefits for refuge visitors. Scholars (Loomis 2000; Shogren 2003) note that it is difficult to estimate the worth of wildlife such as threatened and endangered species. However, the public has demonstrated that they value their existence. According to Shogren (2003, 1), "[f]rom society's perspective, endangered species with limited commercial or consumptive benefits are undervalued by market prices." In other words, although there is no national estimate of the economic benefits, either private or social, the public values wildlife and is willing to pay, on average between $6 to avoid the loss of the striped shiner to over $95 to avoid the loss of the northern spotted owl (Shogren 2003, 4). Furthermore, it is also suggested that benefits from the existence of endangered and threatened species extend beyond the local area, often to the state and possibly even nation- or world-wide (Loomis 2000).

Of the Cabeza Prieta NWR visitors that responded to the survey, 63.5% reported that they participated in wildlife viewing during their visits. Although only 6% of these respondents reported wildlife viewing as the most important reason for their visit, it was the fourth most common response, behind "seeking wilderness solitude," "sightseeing," and "backcountry hiking." Additionally, for respondents who visited the refuge more than ten times within the year, wildlife viewing was the most common response for the most important reason for their visit. Twenty-seven percent of respondents who made 11-20 visits within the year and 24% of respondents who made more than 20 visits within the year reported wildlife viewing to be the most important reason for their visit.

Survey respondents also reported that the opportunity to view rare wildlife was important for their decision to make a trip to Cabeza Prieta NWR. Thirty-five percent of respondents reported that viewing rare wildlife was "very important," while another 32% reported it to be "important" for their decision to visit Cabeza Prieta NWR. Only 3% of respondents reported viewing rare wildlife as "not important" to their visit.

Respondents also reported both the protection and presence of wildlife as important activities for their recreation satisfaction at Cabeza Prieta NWR. These two activities had the highest mean scores (3.59 and 3.26, respectively, on a four point scale) and lowest standard deviations (0.70 and 0.75 respectively) within the ratings. These results show that there is wide agreement among respondents that these activities are highly important for recreation satisfaction. Respondents also reported general satisfaction with current conditions concerning wildlife protection and wildlife presence at Cabeza Prieta NWR, although there was less consensus about the "satisfied" rating (standard deviation is greater than one for both of these activities).

Others may not visit the refuge, but believe it is important that endangered and threatened species are protected (see Loomis 2000).

Overall, for survey respondents the presence of wildlife within Cabeza Prieta NWR is viewed as highly important. Likewise for many stakeholder groups focusing on Cabeza Prieta NWR, wildlife is a critical issue. This response is similar to the results of other surveys where interest in viewing wildlife is strong, and over half of the respondents reported participation in wildlife viewing (Vaske et al. 2001). Additionally, Vaske et al. (2001) also found that wildlife viewing is on the increase, and thus is likely to be even more important to visitors in the future.

For wildlife issues in the Cabeza Prieta NWR region, the civic groups involved can roughly be divided into two coalitions. One coalition can be termed the "preservationist" coalition and the other the "conservationist" coalition. There is no right or wrong answer about how to make wildlife decisions for the refuge, but there are value differences between the two coalitions that make agreement difficult.

The preservationist coalition includes the Wilderness Society, Defenders of Wildlife, Friends of Cabeza Prieta, the Sierra Club, and perhaps others. The conservationist coalition includes the Desert Bighorn Sheep Society, Yuma Valley Rod and Gun Club and other organized wildlife groups. The Arizona Game and Fish Department may also be considered part of this coalition. While the two coalitions are in agreement about the defining wildlife issues on the refuge, they do not necessarily agree about the management objectives for the refuge.

2.1.1.1 Sonoran Pronghorn

The value to the public of endangered and threatened species is discussed in section 2.1.1.

2.1.1.1.1 Population Monitoring

The social benefit of population monitoring is connected to the public's ability to view endangered wildlife while visiting the refuge. If population monitoring leads to management actions that increase Sonoran pronghorn populations, refuge visitors will receive the benefit of increased wildlife viewing opportunities. Non-governmental groups with an interest in protecting Sonoran pronghorn will benefit in the same manner. Observation of collared wildlife is a benefit to some, who view collars as a sign that positive management actions to protect wildlife are occurring.

The social cost of population monitoring may occur if members of the public observe capture and collaring activities or if they see collared pronghorn. These activities may diminish the experience of "naturalness" for visitors, particularly for those who believe the focus of wilderness management should be maintaining naturalness and solitude (Hendee, et al. 1990; Carter 1997). Likewise, aerial tracking of pronghorn may disturb visitors seeking solitude in the refuge. Because the number of pronghorn is small and visitation at the refuge is relatively low, the probability of visitors observing these activities is considered to be minimal.

Non-governmental groups that focus on animal welfare issues may be negatively affected by population monitoring activities because they may believe them to be inhumane.

2.1.1.1.2 Developed Waters

The social benefits of developed waters lies in the possibility that providing these waters reduces wildlife mortality, which can increase the opportunities for wildlife viewing by the public.

Although not specifically addressed by the planning process, undocumented aliens also use developed waters as they traverse the refuge. Availability of these waters may reduce human mortality on the refuge. Although border crossing is not an activity that the Fish and Wildlife Service supports, the potential for human suffering is great if water is removed and no alternative sources of water are provided. Providing water confers a social benefit by preventing some loss of life.

The survey that we sent to Cabeza Prieta NWR visitors did not include questions about developed or supplemental waters. Some visitors added comments about their opinions of water and wildlife on the refuge:

Figure 1: What would have enhanced your experience at Cabeza Prieta National Wildlife Refuge?

1. More water holes for the wildlife.
2. Opportunity to participate in
3. volunteer wildlife projects such as water hole maintenance, forage enhancement; pronghorn recovery.
4. Have managers provide current info on water holes. Game was protected from us
5. I would like to see the AZ Bighorn Sheep Society be able to improve the water supply by being able to repair old waterhole projects and add new ones.
6. Being able to get access to repair bighorn sheep watering holes, via Arizona Dessert Bighorn Sheep Society

Figure 2: What experience did you have at Cabeza Prieta National Wildlife Refuge that would bring you back?

1. The water tanks and the great conditions of roads.
2. Sitting to see Christmas Tank. I (the wife) have read a lot about natural water tanks in the desert. It was really neat to actually see one. Unfortunately there wasn't any wildlife in view while we were there.
3. Solitude. Enjoyed trip down to water source.

Figure 3: Other comments provided by visitors about water on the refuge:

1. We do NOT believe that services (water tanks) placed by private organizations should be allowed on the refuge for use by illegal aliens!
2. All water developments in disrepair and little or no water available for wildlife
3. Please do not apply archaic (old boy) management practices such as predator (coyote) control while attempting to recover the Sonoran Pronghorn population. Habitat fragmentation, forage availability, human (agency/military) impacts, water catchment's benefits/detriments, illegal border crossings, and AGFD activities must be evaluated and addressed adequately before predator control is considered.
4. I would like to see the Wells, water holes put back, and maintained.
5. I think it is very important for the AZ Bighorn Sheep Society to be able to do waterhole projects. There is so little water. It would improve life for all wildlife.

Another social issue related to provision of supplemental waters concerns the presence of water structures or storage tubs in wilderness areas, the motorized vehicles that are used to haul water to the tanks, and the aerial monitoring of water levels in tanks. Each of these features may affect the wilderness experience of visitors by providing indications of human activity. However, some comments that were received on the survey were favorable about the presence of water for wildlife, and some visitors noted that seeing water tanks was a positive experience (see comments above). Individuals or groups that associate evidence or use of water tanks as beneficial to wildlife may be positively affected by the presence of the tanks and associated activities.

Some developed waters are located in parts of the refuge that are designated wilderness. Visitor activities that may be linked to wilderness are backcountry hiking, backcountry camping, and seeking wilderness solitude. Survey responses indicated that 37.1% participated in backcountry hiking on the refuge, 19.0% participated in backcountry camping; and 53.0% sought wilderness solitude. When asked to indicate which refuge activity was the most important reason for their visit, 22.5% stated "seeking wilderness solitude," making this the number one reason for refuge visits ("sightseeing" was the second choice at 15.2%). The presence of developed waters in wilderness areas may adversely affect the wilderness experience for visitors because it may be in conflict with the expectation that wilderness areas show no or little sign of human development.

2.1.1.1.3 Captive Breeding/Translocation

As noted in Section 2.1.1.1, increasing pronghorn numbers may increase the social value of the species because the potential for viewing these animals may increase.

In addition to wildlife viewing, visitor activities that may be affected by a captive breeding/translocation program include sightseeing, hiking near public roads, photography, environmental education, and car camping. The percentages of survey respondents who indicated that they participated in each of these activities is as follows: Sightseeing-66.9%; hiking near public roads- 38.0%; photography- 55.6%; environmental education- 22.5%; car camping- 42.3%.

Depending on the proximity of a captive breeding site to Charlie Bell road, these visitor activities may be enhanced or diminished. For example, the ability to use the captive breeding site as an opportunity for environmental education, with photography and sightseeing as side benefits, could enhance visitor experience. On the other hand, some visitors may not appreciate seeing wildlife in enclosed areas. Vaske et al. (2001, 10) found in their survey of Coloradoans that 70% of respondents would prefer to observe wildlife in wild settings with only a chance of seeing wildlife rather than observing wildlife in enclosed parcels of land where chances of seeing wildlife are greatly increased. In addition, visitor activities may also be diminished if activities such as hiking or camping near the enclosure are curtailed.

Non-governmental groups with an interest in pronghorn recovery will be positively affected if the program is successful. Defenders of Wildlife brought suit against the U.S. Fish and Wildlife Service on the basis that the Sonoran pronghorn recovery plan did not adequately address pronghorn recovery criteria or contain timelines to estimate the amount of time needed for recovery actions. A court-ordered amendment to the plan to address these two issues was published in 2003 (U.S. Fish and Wildlife Service 2003) and is currently being implemented.

Because the translocation and captive breeding plan allows for selective removal of predators, animal rights groups may not have their interests met if this plan is implemented.

2.1.1.1.4 Area Closures

The refuge voluntarily closed Sonoran pronghorn habitat to public recreational access during fawning season (March 15 through July 15). The earlier weeks of this period are times of relatively high visitor counts, but high temperatures in late spring and summer deter many potential visitors. The social benefit of area closures is the possibility that Sonoran pronghorn populations will recover. The social cost is that the public is prohibited from pursuing recreational activities on much of the refuge for four months of the year. Activities such as driving for pleasure, vehicle camping, and others may be curtailed. Members of Native American tribes who access the refuge to travel to places of cultural or spiritual importance may be unable to do so when parts of the refuge are closed.

The survey administered to refuge visitors asked about satisfaction with road conditions. The survey question did not specifically ask about road conditions related to area closures, and some who replied to this question may have responded in terms of their perceptions of whether the roads were well-maintained and easily traveled. When asked about the importance of road conditions in contributing to recreation satisfaction and satisfaction with the management of the refuge in providing expected road conditions, survey respondents indicated high importance and low satisfaction with road conditions.

Many open-ended comments concerned road conditions. For the survey question, "what would enhance your experience at Cabeza Prieta NWR?" 146 responses mentioned road conditions and/or access issues. While most respondents did not specifically mention closures due to pronghorn issues, any activities or events that cause road closures have the potential to negatively affect visitor experience.

2.1.1.1.5 Supplemental Feeding and Forage Enhancements

As noted in Section 2.1.1.1, increasing pronghorn numbers may increase the social value of the species because the potential for viewing these animals may increase.

2.1.1.1.6 Fencing

As noted in Section 2.1.1.1, increasing pronghorn numbers by reducing mortality may increase the social value of the species because the potential for viewing these animals may increase.

2.1.1.2 Lesser Long-nosed Bat

As described in Section 2.1.1., many visitors to the refuge are attracted by the presence of wildlife and, specifically, by the knowledge that threatened or endangered species are on the refuge.

2.1.1.3 Cactus Ferruginous Pygmy-owl

As described in Section 2.1.1, many visitors to the refuge are attracted by the presence of wildlife and, specifically, by the knowledge that threatened or endangered species are on the refuge.

2.1.1.4 Pierson's Milkvetch

As described in Section 2.1.1, many visitors to the refuge are attracted by the presence of wildlife and, specifically, by the knowledge that threatened or endangered species are on the refuge.

2.1.2 Desert Bighorn Sheep Population Monitoring

Aerial population monitoring is conducted by helicopter every three years. This may have an effect on visitors. For some, the effect is likely to be negative but for others the effect would be expected to be neutral or perhaps even positive. For example, individuals who believe that wildlife monitoring can be used to identify ongoing or potential threats to wildlife populations, and that this identification can lead to management actions to assist wildlife may find the experience of aerial monitoring positive. Because the aerial monitoring occurs infrequently, the total impact on visitors is minor. However, for the few who are affected by monitoring activities the effect might be great. Affects on wilderness experience from aircraft over-flights is considered a threat to wilderness according to scholars such as Hendee and Dawson (2001).

2.1.3 Wilderness Stewardship

Wilderness is known to provide many values to humans through on-site recreation use, rehabilitation of the human condition, and wildlife habitat, in addition to off-site benefits in terms of protecting water quality, sequestering carbon, and providing an environment for scientific research (Loomis and Richardson, 2001). Wilderness is both a metaphor for solitude untrammeled by society, and a place to escape from the increasing demands of society (Hollenhorst and Jones 2001, 58). Due to the diverse benefits, management of wilderness is frequently described as a balancing act (Hendee and Dawson 2001; Hollenhorst and Jones 2001).

The introductory section of this report describes visitor ratings of the importance of various activities, including wilderness experiences, to the Cabeza Prieta experience. Any activity

that diminishes the quality of the wilderness experience will have a negative effect on the majority of Cabeza Prieta visitors. This assumes that the characteristics of Cabeza Prieta visitors will be consistent over time. If management actions lead to changes in the type of visitor or the main activities that are pursued at the refuge, this assumption should be re-examined.

The number of visits made to Cabeza Prieta NWR sheds light on what is most important to return visitors (Table 6). Repeat visitors rank "seeking wilderness solitude" as the most important reason for their trip less frequently than do those who visit the refuge five times or fewer.

Table 6: Most Important Activities by Number of Visits

Number of visits within the year	Most important activities (% of respondents who stated it was their most important activity)
1	Seeking wilderness solitude (24%) Sightseeing (15%)
2-5	Seeking wilderness solitude (27%) Sightseeing (16%) Backcountry hiking (14%)
6-10	Sightseeing (25%) Seeing wilderness solitude (13%) Backcountry hiking (13%)
11-20	Wildlife viewing (27%) Sightseeing (18%)
>20	Sightseeing (24%) Wildlife viewing (16%) Photography (16%)

Cabeza Prieta visitors are generally satisfied with their wilderness experience at the refuge, as displayed in Table 7.

Table 7: Responses to "The value of the wilderness opportunities and character I experienced here was what I expected it to be"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	218	31.8	33.9	33.9
	Agree	350	51.1	54.3	88.2
	Not sure	40	5.8	6.2	94.4
	Disagree	30	4.4	4.7	99.1
	Strongly disagree	6	.9	.9	100.0
	Total	644	94.0	100.0	
Missing	No answer	41	6.0		
Total		685	100.0		

2.1.3.1 Minimum Requirements Analysis

Application of Minimum Requirements Analysis (MRA) is meant to minimize the impacts of management activities in wilderness areas. Even minimal uses may have a negative effect on an individual's wilderness experience. If a visitor encounters refuge staff performing these activities, the impact may be that their experience is no longer considered a wilderness experience. Given the remote nature of the refuge, it is possible that human encounters of any type would be disturbing to some visitors, because some place a high value on the ability to encounter few other humans while on the refuge.

2.1.3.2 Border Law Enforcement

The Arizona Desert Wilderness Act allows some activities that would otherwise be prohibited in wilderness areas. These activities relate to border law enforcement and military activities. When asked about the importance of border impacts to their visits, survey respondents indicated that this issue was important (mean of 2.95 on a scale from 1-4 where 1 = not important and 4 = very important; standard deviation of 1.084). Visitors ranked their satisfaction with

conditions somewhat low (mean of 2.39 on a scale from 1-5 where 1 = poor conditions and 5 = outstanding conditions; standard deviation of 1.258).

When asked to respond to the statement, "Border impacts and activities adversely affected my visit to the refuge, 39% answered either "strongly agree" or "agree" while 38.1% answered either "disagree" or "strongly disagree." Many open ended comments on the survey alluded to border impacts and activities, almost all in a negative sense. Of the contributions to the open-ended comment page on the back of the survey, about 18% were related to border activities (58 comments out of 321 total). In response to the survey question, "What would enhance your experience at Cabeza Prieta NWR?" about 16% (76 responses out of 480) mentioned some aspect of border activities and control.

Border activities will continue to negatively affect visitors to the refuge under current policies that are, to a large extent, not under the control of the refuge or the Department of the Interior.

2.1.3.3 Wilderness Impact Monitoring

The positive social effect of wilderness impact monitoring is that these activities may lead to preservation of wilderness character over time. Another effect, which may be either positive or negative, is that wilderness visitors may notice monitoring areas. For some this will be a negative experience because it will show evidence of human activity on the landscape. For others it will be a positive experience because it will provide an educational opportunity to view a scientific research project. Other visitors who believe the wilderness monitoring and research are important functions will be positively affected by evidence of monitoring activities.

2.1.4 Cultural Resources Management

Cultural resources include "archeological resources, historic and architectural properties, and areas or sites of traditional or religious significance to Native Americans (614 FW 1, Natural and Cultural Resources Management). Part of the process of cultural resource management includes dealing with issues of access to cultural resources by Native Americans. The Tohono O'odham tribe in southern Arizona traditionally occupied an area of land bounded by the Gila River on the north, the Sonora River on the south, the Colorado River on the West, and the San Pedro River on the east. Thus, Cabeza Prieta NWR exists where the Tohono O'odham and other tribal groups previously lived. To the extent that refuge management activities exclude Native Americans from traditional cultural or sacred sites, there is the possibility for negative impacts to tribal groups.

For many Native Americans, physical features and objects on public lands hold both political and spiritual significance (Zellmer 2002). A close relationship with traditional lands permeates their lives, sustaining the health and well-being of members and the integrity of the tribes (Zellmer 2002). Furthermore, many tribe's religious beliefs are site-specific, intimately associated with their traditional lands and its natural features (Zellmer 2002, 432). In light of this, Congress has expressed the objective of preserving cultural resources on public land, particularly those of interest to Native Americans. However, public lands laws grant extensive discretion to the land management agencies, "discretion that has been used most frequently to favor economic and recreational activities over cultural practices" (Zellmer 2002, 415). Due to both of these issues, well-designed cultural resource management programs are not only beneficial to the Native peoples—helping protect their culture, but are also ultimately beneficial to the government—forming better relations with Native peoples and broadening the reasons for resource protection, thus drawing attention to the twin issues of environmental protection and cultural survival (Kamieniecki and Scully Granzeier 1998).

Cultural resources management provides social benefits because these practices preserve historical sites. The visitor survey did not ask specific questions about perceptions of cultural resources on the refuge. Two open-ended comments received on the survey focused on access to archeological sites by research groups.

2.1.5 Research

As noted by Loomis and Richardson (2001, 32), wilderness provides a "natural bench-mark or control area for judging the effects of human development on natural systems and understanding

of unfettered ecological processes."

2.1.5.1 Biological Research

2.1.5.1.1 Sonoran Pronghorn

Research to support Sonoran pronghorn recovery goals has the net social benefit of recovering a population considered important to the nation, as recognized by its designation as an endangered species under the Endangered Species Act of 1973, as amended (16 U.S.C. 1532 et seq.).

Research activities may enhance or diminish visitor experiences on the refuge, depending on the type of activity and the perception of the individual visitor about the activity.

2.1.5.1.2 Desert Bighorn Sheep

Research to better understand the biology of desert bighorn sheep will assist in maintaining a viable population on the refuge. This provides social benefits of wildlife viewing, hunting, and the advancement of scientific knowledge.

Research activities may enhance or diminish visitor experiences on the refuge, depending on the type of activity and the perception of the individual visitor about the activity.

2.1.5.1.3 Other Species

Research to support recovery goals for any threatened or endangered species has the net social benefit of recovering a population considered important to the nation, as recognized by designation as an endangered or threatened species under the Endangered Species Act of 1973, as amended (16 U.S.C. 1532 et seq.).

Research to investigate the status of non-threatened or non-endangered species may have a social benefit by providing information to managers about the distribution and abundance of refuge species. This may allow managers to fulfill their public trust duties to protect wildlife and plants under their jurisdiction.

Research activities may enhance or diminish visitor experiences on the refuge, depending on the type of activity and the perception of the individual visitor about the activity.

2.1.5.1.4 Ecological Integrity

Research to investigate the ecological integrity of the refuge may have a social benefit by providing information to managers about the ecological health of the refuge. This may have the broader social benefit of contributing to ecosystem integrity in the Sonoran Desert ecosystem.

Refuge visitors were not asked survey questions that directly related to ecological integrity. However, many visitors to the refuge value the benefits provided in the ecoregion by the diversity of vegetation that supports a rich variety of mammals, reptiles, birds, and amphibians. Management activities that promote ecosystem integrity are likely to increase visitor satisfaction by providing opportunities to view wildlife and plants.

Research activities may enhance or diminish visitor experiences on the refuge, depending on the type of activity and the perception of the individual visitor about the activity.

2.1.4.1.5 Exotic and Invasive Species

Research to investigate the exotic and invasive species on the refuge may confer a social benefit by providing information to managers about the level of exotic species infestation on the refuge so that control measures may be taken and the results of these measures can be monitored. This may have the broader social benefit of contributing to the ecological health of the refuge and other locations in the Sonoran Desert ecosystem.

Refuge visitors were not asked survey questions that directly related to ecological integrity. However, many visitors to the refuge value the benefits provided in the ecoregion by the rich variety of mammals, reptiles, birds, and amphibians. Exotic and invasive species may affect the abundance and diversity of native flora and fauna.

A potential negative effect of strategies to control exotic and invasive species is that visitors may be prohibited from using pack animals on the refuge. This effect is anticipated to be minimal because only a few individuals use pack animals on the refuge each year, and some proposed alternatives prohibit these uses.

Research activities may enhance or diminish visitor experiences on the refuge, depending on the type of activity and the perception of the individual visitor about the activity.

2.1.5.2 Wilderness Research

As noted in Sections 2.1.1.1.2 and 2.1.3, wilderness experiences are highly valued by visitors to Cabeza Prieta NWR. Research to identify threats to wilderness has the potential benefit of preserving the wilderness character of the refuge, which is a benefit to visitors and to society as a whole.

Research activities may enhance or diminish visitor experiences on the refuge, depending on the type of activity and the perception of the individual visitor about the activity.

2.1.5.3 Visitor Service Research

Research on visitor experiences and perceptions is beneficial because it helps refuge managers and planners provide refuge-compatible recreational activities for visitors. Increased knowledge of visitors and visitation trends allows managers to plan for future recreation trends. In the face of changing demographics across the United States, understanding trends about visitor characteristics is important.

Providing refuge-compatible recreation experiences is not the only reason to conduct visitor service research. The results of research can also help managers identify opportunities for interpretation of refuge resources, and for education about the value of refuges.

Office of Management and Budget protocols govern survey research conducted by federal scientists or with federal funds. When these protocols are followed and OMB clearance is obtained, the social costs of collecting survey data are considered to be minimal.

2.1.5.4 Cultural Resources Research

Cultural resources research may have either a positive or a negative effect on the Tohono O'odham, the Hia-Ced O'odham and Yuman/Patayan Nations. If this research is done in cooperation with these nations and provides information that is valued, the social effect will be positive. If the research is conducted in a manner that is not considered culturally acceptable, the social effect may be negative.

Research activities may enhance or diminish visitor experiences on the refuge, depending on the type of activity and the perception of the individual visitor about the activity.

2.2 ALTERNATIVE 1: NO ACTION ALTERNATIVE (CURRENT MANAGEMENT)

This alternative describes the current management activities at the refuge. These programs and activities would continue if none of the action alternatives (Alternatives 2 through 5) were adopted. Management activities are focused on recovery of the endangered Sonoran pronghorn, maintaining the populations of desert bighorn sheep, monitoring nongame wildlife species, monitoring and controlling invasive species, protecting wilderness character, and providing visitors with quality wildlife-dependant recreational experiences that are compatible with the refuge purposes. If this alternative were adopted, a total of 8146 visitor days would be expected. Of these, 7806 visitor days would be by recreational users and 240 by big game hunters.

2.2.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance, and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.2.1.1 Endangered and Threatened Species

See discussion above in Section 2.1.1 under Elements Common to All Alternatives.

2.2.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge. As discussed in Section 2.1.1, 63.5% of visitors to Cabeza Prieta NWR reported that they participated in wildlife viewing during their visit.

Creation of a national wildlife refuge implies that the unit has importance that transcends local or even regional issues. The mission of the national wildlife refuge system is "...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" [16USC668dd (a)(2)]. Because Cabeza Prieta was created, in part, to protect desert bighorn sheep, the social value of the sheep population is an essential feature of the refuge.

2.2.1.2.1 Developed Waters

The social effects of providing developed waters for desert bighorn sheep are discussed in Section 2.1.1.2. The no-action alternative would provide continued desert bighorn sheep viewing and hunting opportunities for Cabeza Prieta visitors. Wildlife viewing is usually considered a positive activity. Hunting is considered a positive activity to some, and a negative activity to others.

Possible negative effects of developed waters include impairment of visitors' wilderness experience because of the evidence of human presence, in terms of water structures, monitoring cameras, and refuge staff involved in water hauling activities. Water hauling is subject to Minimum Requirements Analysis. Use of motorized transport is likely to have a stronger effect on visitor experience than use of non-motorized transport.

2.2.1.2.2 Population Goal

Attainment of population goals is related to number of desert bighorn sheep available for wildlife viewing and hunting. Under the no-action alternative, visitors would continue to visit the refuge to see desert bighorn sheep. Hunting would continue at approximately the same level (8 or fewer permits per year).

2.2.1.3 Desert Ecosystem Integrity Monitoring

2.2.1.3.1 Migratory Birds

Bird watching is an important activity for many visitors to Cabeza Prieta and the surrounding Sonoran Desert. Just over 33% of Cabeza Prieta NWR visitors indicated that they participated in bird watching during their most recent trip to the refuge. When survey respondents were asked how important various activities were in their decision to take a recreation trip to the

refuge, 43.5% stated that bird watching was either "important" or "very important" to their decision, while another 33.9% noted that it was "somewhat important." One interpretation of this result is that visitors anticipate birding during their visit but do not have the opportunity to do so once they arrive at the refuge. These results are similar to those found by Vaske et al. (2001). Additionally, Vaske et al. (2001) note that despite large numbers of visitors who state that wildlife viewing (including bird watching) is very important to their trip, a certain percentage of these visitors are not successful in seeing wildlife, thus the numbers of those who participated in the activity are lower than the numbers of those who state it as important to their trip. Finally, Vaske et al. (2001, 35) also suggest that birders frequently have a strong commitment to birds, a breadth of knowledge, and are willing to make financial investments in bird watching, thus they provide benefits to areas that support bird watching.

2.2.1.3.2 Reptiles and Amphibians

The presence of reptiles and amphibians on the refuge may be one indicator of ecosystem health. Refuge visitors find the opportunity to view wildlife important to their experience. The no-action alternative, which includes survey and monitoring of reptile and amphibians, provides benefits by supporting opportunities for wildlife viewing.

2.2.1.3.3 Game Animals

The no-action alternative does not allow hunting for game animals other than desert bighorn sheep. The value of these animals for visitors is that they provide opportunities for wildlife viewing, which is an important refuge activity.

2.2.1.3.4 Long-term Desert Integrity Monitoring

The no-action alternative provides the social value of monitoring, with the long-term objective of maintaining desert health. This provides a benefit to visitors and to others.

Remote sensing meteorological instruments and vegetation transects, if located in wilderness, may impinge on visitors' sense of remoteness and solitude.

2.2.1.3.5 Exotic/Invasive Species

Public uses of the refuge are affected by the presence of exotic or invasive species. If native flora is replaced by exotic species, food sources for refuge wildlife may be damaged or destroyed. A resulting loss of wildlife would affect opportunities for wildlife viewing and hunting, and perhaps the survival of endangered species on the refuge. The no-action alternative may have a negative effect on visitors and the greater public if it does not aggressively control invasive species.

2.2.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.2.2.1 Abandoned Vehicles

The no-action alternative may enhance enjoyment of refuge wilderness by removing signs of human activity. Studies of wilderness users have shown that the sense of a lack of human developments contributes to an individual's belief that they are in a wilderness setting (Hall 2001).

Actions to remove the vehicles may have a negative impact on visitor experience. Sounds of vehicles are known to be a negative experience for wilderness visitors (Hall 2001; Taylor 2003). These removal activities may also cause wildlife disturbance. Because wildlife viewing and hunting are permitted refuge uses, this disturbance may diminish visitor experiences and cause negative social impacts.

The no-action alternative provides the net benefit of removing signs of humans but may have a negative effect on those who are in the locale when the removal activities are conducted.

2.2.3.2 Military Debris Removal

Removing active ordnance protects human health and safety. The activities required for removal may diminish the experience of refuge visitors, depending on the time of year and other factors that affect visitation levels on the refuge. Because of the possibility of harm to humans if left intact, the no-action alternative provides a positive benefit.

2.2.3.3 Administrative Trails

Use of administrative trails for refuge management activities and border patrol activities provides benefits in supporting essential management activities. Rehabilitation of non-authorized vehicle trackways also provides benefits by protecting refuge resources and wilderness character.

The presence and use of administrative trails will have a positive impact on those who view access-dependent management activities as positive. For example, maintaining water tanks and hauling water to some of the tanks is currently achieved by using the administrative trails for access. This provides a benefit for those who support the use of water tanks for wildlife. Closure of trails would make access difficult, or would require alternative means of access. This could cause a negative impact to those who support the use of water tanks for wildlife.

The presence and use of administrative trails is likely to have a negative effect on some wilderness recreational users. Some will be affected by the sight and presence of administrative trails, believing that these trails should not be present in wilderness areas. Others will be negatively affected if they encounter vehicles on trails because it diminishes the sense of solitude, which is an important wilderness value (Hall 2001; Hollenhorst and Jones 2001). Some organized wilderness groups oppose the current uses of administrative trails in wilderness areas (Wild Wilderness 2003). Continuing the use of administrative trails in wilderness areas will have a negative social affect on wilderness groups that share this perspective.

2.2.3.4 Childs Mountain Communications Site

The visibility of the Childs Mountain Communication site from wilderness areas of the refuge may have a negative effect on wilderness experience. As noted in Section 2.2.2.1, evidence of human impacts or developments in wilderness areas may diminish the quality of a wilderness experience.

2.2.4 Goal: Visitor Services Management

Achieving these visitor services goals will enhance the experience of refuge visitors and achieve refuge purposes.

2.2.4.1 Access Management

Access to the refuge is not limited by number. Visitors must obtain permits to drive on refuge roads, and must comply with postings of closed areas. In some portions of the refuge, high-clearance vehicles are required.

The requirement to obtain a permit for entry to the refuge may deter some visitors. On the visitors' survey, 59.1% indicated that the permit system was "important" or "very important" in contributing to recreation satisfaction and 51.8% were satisfied with the management of the permit system. Fifty-two percent stated that limits on the total number of visitors was "important" or "very important" to their recreation satisfaction, and 39.0% stated that the refuge was "good" or "outstanding" at providing limits. Although visitors may believe that the refuge limits visitation, in fact there are no limits. Difficult roads, hot summers, and remoteness may naturally limit the number of visitors at this time.

The fact that the refuge office is closed on Sunday may deter some visitors, especially those who make unplanned stops.

Limits on types of vehicles on refuge roads means that some potential refuge visitors may be denied access. Although this is a negative impact for those individuals, it may be offset by the fact that it will not be necessary for refuge staff to rescue unprepared motorists. Less vehicle traffic is a benefit to the wilderness character of the refuge, which is highly valued by many visitors. Traffic, vehicle noise, and high numbers of visitors are sometimes reported as negative experiences by wilderness users. These factors may also contribute to wildlife disturbance.

2.2.4.2 Hunt Program

Hunting is one of the big six uses of refuges and is allowed if it is determined to be compatible with refuge purposes. Hunting programs also have long been supported in wilderness areas within the United States. However, as times have changed, visitors to public lands and wilderness areas have also changed. Thus, the trend is more toward recreation and less towards hunting within these areas. Additionally, there is a degree of conflict between hunters and non-

hunters. Traditional users such as hunters may find the presence of others as threatening to successful hunting (Watson 2001, 64). On the other hand, non-hunters frequently value the scenic quality of seeing large, wild animals and can be negatively affected when encountering the realities of hunting (Watson 2001).

The social benefits of the current hunt program are that the program provides a high quality and unique hunting experience for those who obtain hunting permits. In addition to those who obtain permits or accompany permit holders on hunting and scouting trips, some non-governmental groups promote hunting and invest time and other resources in activities related to bighorn sheep conservation. Hunting may, then, have a positive social impact even if an individual does not have the opportunity to hunt. This may be considered in a parallel way to the concept of "existence values" of wilderness. To those who support hunting, the knowledge that hunting is available may provide a benefit, even if not every individual participates in that activity.

Not all members of the public believe that hunting in national wildlife refuges is an acceptable activity and question the wisdom of maintaining game for hunt purposes. Thus, the hunt program produces a negative effect for some (see Fund For Animals 2003).

2.2.4.3 Leave-No-Trace Program

The LNT program provides an opportunity for environmental education and interpretation, which are two recognized purposes of national wildlife refuges. Providing this training is of social value. Some researchers have noted that recreational impacts in wilderness areas have increased in recent decades despite efforts to educate the public about low-impact uses (Cole 1994). The refuge's LNT program may prevent recreational impacts from damaging refuge resources.

2.2.4.4 Environmental Education

Environmental education is one of six wildlife dependent refuge activities defined by the U.S. Fish and Wildlife Service. Environmental education is another issue area where wilderness such as Cabeza Prieta NWR provides benefits. According to Loomis and Richardson (2001, 33), wilderness provides a natural laboratory for not only public and private schools, but also for organizations that help teenagers and adults develop life skills. Environmental education may increase individual awareness of the importance of protected areas.

2.2.4.5 Interpretation

Interpretation is one of six wildlife dependent activities designated by the U.S. Fish and Wildlife Service. Interpretation activities increase visitor understanding of the refuge. They also broaden the scope of the type of activities in which visitors may participate. Interpretation in the no-action alternative provides benefits to visitors who drive onto the refuge and to those who make shorter visits to less-remote areas of the refuge or to the visitor center.

2.2.4.6 Camping

The no-action alternative allows for the continuation of camping on the refuge, with some restrictions. Camping provides a benefit to refuge visitors by providing the opportunity to explore more remote areas of the refuge and experience wilderness solitude. Respondents to visitor surveys indicated that these are important experiences. Campers may cause resource damage and wildlife disturbance. To the extent that this occurs, camping may produce a negative social impact.

2.2.4.7 Pack and Saddle Stock

The no-action alternative allows continued use of pack and saddle stock, subject to limitations. The benefits accrue mainly to hunters, as it would be difficult to access hunting areas and remove hunted bighorn sheep without pack and saddle stock.

2.2.5 Goal: Cultural Resources Management

This is addressed in Section 2.1.4.

2.3 ALTERNATIVE 2: MINIMUM INTERVENTION

This alternative features an approach to refuge management that minimizes active intervention on ecological processes, particularly within the refuge wilderness areas. Other than management activities required for Sonoran pronghorn or other endangered species recovery, the refuge will not haul water in wilderness; develop new, or redevelop existing, wildlife waters; or otherwise attempt to support wildlife populations greater than those that refuge natural resources and precipitation support in the context of existing decimating factors. These factors include changes in native vegetation due to past over-grazing by domestic livestock, introduction of exotic plants and animal species, fragmentation of the habitats of wide ranging species and introduction of diseases from domestic livestock. Under this alternative, a projected 7771 visitor days would be anticipated. Of these, all would be for recreational use and none for hunting.

2.3.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.3.1.1 Endangered and Threatened Species

In addition to the measures described in Section 2.1.1 above, Elements Common to All Alternatives, the following measure will be implemented.

2.3.1.1.1 Sonoran Pronghorn Population Monitoring

When weather and populations conditions permit radio collaring Sonoran pronghorn, any collaring operations will proceed only in non-wilderness areas. The social benefit of this practice is the possibility that radio collaring will assist with long term Sonoran pronghorn recovery efforts.

If limiting these activities to non-wilderness areas is less successful than the option radio collaring in both wilderness and non-wilderness, and populations continue to decline the social effect will be fewer opportunities for wildlife viewing and the potential to lose an endangered species.

Radio collaring may be perceived negatively by the public and animal rights groups. Part of this is the visual impact of seeing a radio collared animal and part is concern over capture myopathy. Other groups and individuals may not perceive radio collaring as a negative activity, and may believe the long term benefit of encouraging recovery of the Sonoran pronghorn outweighs the short term costs of radio collaring.

2.3.1.1.2 Sonoran Pronghorn Developed Waters

If photovoltaic sensors are installed fewer water hauling trips may be necessary. Because water hauling activities are likely to have a negative effect on visitor experiences, especially in wilderness areas, minimizing these trips would have a positive effect on visitor experiences.

Groups and individuals with concerns regarding adequate provision of water for Sonoran pronghorn would not be affected by this practice.

2.3.1.1.3 Supplemental Feeding and Forage Enhancements for Sonoran Pronghorn

Locating forage enhancement plots or supplemental feeding programs in non-wilderness areas would minimize impacts on visitors' wilderness experience.

Locating these programs in non-wilderness areas may result in some restrictions of visitor access. This may be partially offset by increased opportunities for wildlife viewing, both in the short-term (visitors may see wildlife congregated in feeding areas) and in the long-term (larger pronghorn populations may increase potential for wildlife viewing).

2.3.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.3.1.2.1 Developed Waters

Removing developed waters in wilderness areas would provide the social benefit of diminishing signs of human intervention in these areas. This would benefit visitors or wilderness

advocates who find the developed waters a negative feature. If removal of these waters results in lower numbers of desert bighorn sheep, or causes harm to other species this would cause a negative impact to society and to specific groups or individuals with concerns about wildlife in Cabeza Prieta NWR.

The activities required to remove water tanks in wilderness would potentially harm visitors' wilderness experience if they were in a location when removal activities were underway.

Undocumented aliens who use developed waters as they traverse the refuge would also face potential harm.

2.3.1.2.2 Population Goal

A population goal of 100 to 200 would benefit those who believe that supplemental water provision supports an unnaturally high number of sheep.

This population goal would result in an end to the hunt program on the refuge. Hunting is a highly important activity for a small number of people each year. Elimination of the hunt would create a negative impact for hunters, or for potential hunters. Members of organized groups with an interest in desert bighorn sheep would also be negatively affected by a population goal of 100 to 200 sheep. For example, the mission of the Arizona Desert Bighorn Sheep Society is to "promote the management of bighorn sheep and increase their population in the state of Arizona" (Arizona Desert Bighorn Sheep Society 2003).

2.3.1.3 Desert Ecosystem Integrity

2.3.1.3.1 Migratory Birds

See Section 2.2.1.3.1.

2.3.1.3.2 Reptiles and Amphibians

See Section 2.2.1.3.2.

Limiting research activities could curtail the ability of managers to take necessary action to protect reptiles and amphibians. Loss of or damage to these resources is a potential negative social impact.

2.3.1.3.3 Long-term Desert Integrity Monitoring

See Section 2.2.1.3.4.

2.3.1.3.4 Exotic/Invasive Species

See Section 2.2.1.3.5.

Refuge staff will continue to record the location of exotic species infestations. Staff will continue to hand pull fountain grass where new infestations occur and remove trespass cattle, goats and burros.

2.3.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.3.2.1 Abandoned Vehicles

See Section 2.2.2.1.

2.3.2.2 Military Debris Removal

See Section 2.2.2.2

2.3.2.3 Border Law Enforcement

2.3.2.4 See Section 2.1.3.2

2.3.2.4 Administrative Trails

See Section 2.2.3.3.

Closing some administrative trails will improve the wilderness experience and sense of solitude for some refuge visitors. Administrative trail closure may cause negative impacts associated with diminished ability to haul water or maintain water tanks.

2.3.2.5 Wilderness Impact Monitoring

In addition to the social impacts described in Section 2.1.3.3, this alternative provides the social benefit of documenting damage to wilderness resources from a variety of uses, both legal and illegal. If the ability to monitor these changes leads to management actions this will provide a social

benefit to those who value wilderness.

The addition of over flights to document impacts will cause minimal social impacts because the frequency is anticipated to be biennial. Few visitors will be affected by this practice.

2.3.2.6 Childs Mountain Communications Site

Removal of facilities from the Childs Mountain site would eliminate the negative visual impacts of the site. This would benefit those in wilderness areas within view of the communications site. If the facilities provide services to the public that are not replaceable, this will produce a negative social impact.

2.3.3 Goal: Visitor Services Management

See Section 2.2.4

2.3.3.1 Access Management

See Section 2.2.4.1. Elimination of pack and saddle stock from all areas of the refuge would affect those who wish to ride horses in the refuge. The visitors' survey of 685 respondents included 4 who indicated that they rode horseback on the refuge, and none indicated that it was the most important reason for their visit. The effect of eliminating pack and saddle stock from the refuge would be negative for the few who participate but minimal overall. Because hunting is not allowed under this alternative, and most who use pack and saddle stock do so as part of a hunting trip, the effect of this action is likely to be minimal.

2.3.3.2 Hunt Program

Potential hunters would be negatively affected by this alternative because no hunting is allowed. Organized groups that support hunting would be negatively affected.

This alternative would provide a benefit to those opposed to hunting. It would also benefit those whose wilderness experiences are negatively affected by hunting activities.

2.3.3.3 Leave-No-Trace Program

See Section 2.2.4.3.

Requiring the leaders of organized groups to receive LNT training may reduce human impacts to refuge resources, thereby providing a social benefit.

2.3.3.4 Environmental Education

See Section 2.2.4.4.

2.3.3.5 Interpretation

See Section 2.2.4.5.

Keeping the visitors' center open seven days a week during the winter season will increase opportunities for interpretation, which is a recognized refuge purpose. It may also serve the purpose of increasing visitation as it offers the opportunity for visitors to receive permits every day of the week.

2.3.3.6 Camping

See Section 2.2.4.6.

This alternative decreases the number of developed campgrounds to one, from three. This may have the benefit of protecting refuge resources, including wildlife, because each campground leaves signs of human activity. This is considered a social benefit because protection of refuge resources has a value that extends beyond the individual refuge.

Because this alternative reduces the number of people or groups that may camp on the refuge at any given time, the potential negative impact is that people who wish to camp may be unable to do so. Visitors indicated that camping in the front-country and camping in the backcountry were somewhat important to their experience at the refuge. Reducing the total number of camping sites will reduce opportunities for wildlife observation and photography.

2.3.4 Goal: Cultural Resources Management

See Section 2.1.4.

2.4 ALTERNATIVE 3: RESTRAINED INTERVENTION

This alternative uses a limited amount of active management/habitat manipulation in wilderness. While a primary focus of this alternative is supporting wildlife populations primarily with naturally occurring precipitation and the forage it fosters, supplemental water will be provided to developed waters, as an infrequent measure during periods of drought. While not embracing aggressive manipulation of habitats and processes, this alternative includes support of wildlife populations through some maintenance of developed waters and hauling of supplemental water during dry periods. This alternative also favors increased habitat manipulation outside of wilderness.

Under this alternative, a total of 7856-8011 visitor days is expected. Of these, 7771 would be recreational and 85-240 would be for hunting.

2.4.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.4.1.1 Endangered and Threatened Species

2.4.1.1.1 Sonoran Pronghorn Developed Waters

See Section 2.3.1.1.2

2.4.1.1.2 Predator Studies

This alternative will investigate predators on the refuge. The social benefit relates to the ability to determine the effect of coyote predation on Sonoran pronghorn populations. Because protecting endangered species has been determined to be a broad social benefit, the ability to understand the effects of predation on pronghorn populations is important.

Some individuals and non-governmental interest groups object to predator control. These individuals and groups will be negatively affected by predator control activities. Studies to determine public attitudes about predators and predator control have shown that the public's attitudes have shifted. Generally, attitudes towards predators were unfavorable prior to the 1970s but have become more favorable in the decades since then (Hewitt, 2001). Attitudes towards lethal methods of predator control are generally unfavorable (Andelt et al. 1999; Reiter et al. 1999). Messmer et al. (1999) conducted a survey of the general public and found that when survey questions about predator control were put in the context of a specific management objective, support for some types of predator control increased.

Some groups and individuals support predator hunts for the protection of other species, and for other reasons. A predator hunt would provide social benefits for these groups and individuals.

2.4.1.1.3 Fencing

As noted in Section 2.1.1.1, increasing pronghorn numbers by reducing mortality may increase the social value of the species because the potential for viewing these animals may increase. Other impacts of fencing are covered in Sections 2.1.1.3 and 2.1.1.1.3.

This alternative removes some barriers to wildlife movements and provides the social benefit of protecting an endangered species.

2.4.1.1.4 Habitat Restoration Research

This research could promote pronghorn survival by providing forage and conferring the social benefit of helping to protect an endangered species.

2.4.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.4.1.2.1 Developed Waters

See Section 2.3.1.2.1.

The possibility of locating additional developed waters in non-wilderness areas may offset the removal of waters from wilderness areas. These additional waters could provide wildlife

viewing opportunities for visitors.

2.4.1.2.2 Population Goal

A population goal of 250-350 would benefit those who believe that supplemental water provision supports an unnaturally high number of sheep.

This population goal allows for limited hunting in non-drought years. Hunting is an important activity for a small number of people each year. During drought years potential hunters would be negatively affected by this alternative. Members of organized groups with an interest in desert bighorn sheep might be negatively affected by the population goal set forth in this alternative.

Visitors may have increased opportunities to view desert bighorn sheep if developed waters are more accessible than those in wilderness areas.

The number of desert bighorn sheep in this alternative is fewer than what the refuge may have supported in the past. Therefore, the potential negative social impact is conditioned by the fact that long term impacts to refuge resources makes it difficult to ascertain what conditions prevailed prior to human-caused changes.

2.4.1.2.4 Predator Studies

Predator studies may result in management actions to reduce desert bighorn sheep mortality. This provides a social benefit to potential hunters and to visitors who view wildlife. It also provides the broad social value of protecting an important refuge species. In addition, gaining knowledge about predators and predator-prey dynamics adds to the body of scientific knowledge, which is considered by the scientific community to be a social benefit. Additionally, these studies may confer the benefit of providing information for management decisions.

2.4.1.3 Desert Ecosystem Integrity Monitoring

2.4.1.3.1 Migratory Birds

See Section 2.2.1.3.1

2.4.1.3.2 Reptiles and Amphibians

See Section 2.3.1.3.2.

2.4.1.3.3 Long-term Desert Integrity Monitoring

See Section 2.2.1.3.4.

The additional monitoring activities in this alternative would provide social benefits by providing managers with data for decisions about protecting desert health. If the refuge utilizes the data produced in management activities, this provides a benefit to visitors to the refuge by helping to maintain refuge resources.

2.4.1.3.4 Exotic/Invasive Species

See Section 2.2.1.3.5.

This alternative allows for more aggressive exotic/invasive control and revegetation. Active management of invasive species provides a social benefit by conserving refuge resources and addressing the underlying aspects of habitat degradation.

2.4.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.4.2.1 Minimum Requirements Analysis

See Section 2.1.3.1.

2.4.2.2 Abandoned Vehicles

See Section 2.2.2.1.

Use of helicopters to remove abandoned vehicles provides the social benefit of removing a human caused disturbance to wilderness.

The social cost of this activity is the noise and visual intrusion of helicopters. Wilderness visitors highly value solitude and silence. Any impact to these wilderness qualities negatively affects wilderness recreationists.

2.4.2.3 Military Debris Removal

See Section 2.2.2.2.

Removing tow darts would provide the social benefit of removing visual intrusions from the refuge. The social cost is connected to the human activity and noise required to accomplish these removals. Another potential social cost is related to wildlife impacts. If military debris removal disturbs wildlife, this creates a negative social impact because protection and preservation of wildlife is a primary refuge purpose.

2.4.2.4 Administrative Trails

Closing some administrative trails will improve the wilderness experience and sense of solitude for some refuge visitors. Closures may also limit the ability of refuge managers to perform certain activities. If this limit results in damage to refuge resources, including refuge wildlife, a negative impact will occur.

2.4.2.5 Wilderness Impact Monitoring

See Section 2.3.2.5.

This alternative includes a plan to study wilderness use and values. This will provide a positive social benefit. A large number of visitors to the refuge are attracted by the opportunity for wilderness solitude. Gaining a better understanding of how visitors respond to the wilderness character of the refuge, and how refuge visitors perceive human impacts, will help refuge managers to provide high quality wilderness experiences.

This action will cause a negative social effect to potential or current wilderness users if some refuge uses are restricted as a result of wilderness studies.

2.4.2.6 Border Law Enforcement

See Section 2.1.3.2.

Providing training to border patrol agents on refuge resources may provide social benefits by leading to a decrease in border patrol impacts. Some visitors noted the impacts of border patrol, and future visitors may be more satisfied with visits to the refuge if border patrol activities were less intrusive.

2.4.2.7 Childs Mountain Communications Site

See Section 2.3.2.6.

2.4.3 Goal: Visitor Services Management

See Section 2.2.4.

2.4.3.1 Access Management

See Section 2.3.3.1.

2.4.3.2 Hunt Program

2.4.3.2.1 Desert Bighorn Sheep

See Section 2.2.4.2.

2.4.3.3 Leave-No-Trace Program

See Section 2.3.3.3.

2.4.3.4 Environmental Education

See Section 2.2.4.4.

2.4.3.5 Interpretation

This alternative provides a greater volume of interpretive materials, increasing the value of this activity to visitors. The potential for a loop road would increase opportunities for visitors to view refuge resources and is anticipated to increase visitation. This would provide a social benefit to visitors who may have not visited the refuge in the past due to access issues. It could provide a social cost to refuge visitors who value solitude. If wildlife is negatively affected by the presence of an additional road and increased vehicular traffic this would cause a negative social impact.

2.4.3.6 Camping

See Section 2.3.3.6.

2.4.4 Goal: Cultural Resources Management

See Section 2.1.4.

2.5 ALTERNATIVE 4 (PROPOSED ALTERNATIVE): ACTIVE MANAGEMENT

This alternative features an approach to refuge management focusing on supporting Sonoran pronghorn and desert bighorn sheep population numbers through maintenance and supply of developed waters. In the context of providing reliable water for desert bighorn sheep and Sonoran pronghorn, the refuge will continue to investigate and implement measures, including biological monitoring, to reduce and eventually eliminate the need to haul water in wilderness. Refuge visitation under this alternative is projected at 8496 visitor days. This includes 8656 recreational visitor days and 265 hunter visitor days.

2.5.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.5.1.1 Endangered and Threatened Species

The refuge will continue to participate in recovery of endangered and threatened species as described above in Section 2.1.1 under Elements Common to All Alternatives, with the following additions.

2.5.1.1.1 Sonoran Pronghorn Developed Waters

For discussion of the social effects of developed waters, see Sections 2.1.1.1.2, 2.3.1.2.1, and 2.2.1.2.1.

Under this alternative, the refuge will implement a program of up grading existing developed waters in wilderness. This will have the short-term social cost of increasing human caused intrusions into wilderness areas. The sights and sounds of the construction activities may impinge on visitors' sense of solitude. The long term social benefit of upgrading the tanks and installing photovoltaic sensors is that trips to haul water may be less frequent, causing less intrusion into visitors' wilderness experience. If the appearance of tanks is modified to create less visual intrusion, this will confer a benefit by creating less visual disturbance to visitors in wilderness. If tanks support wildlife populations, those who value wildlife and wildlife-dependent activities will receive a net social benefit.

Weekly aerial reconnaissance to check water levels may disturb wilderness visitors.

2.5.1.1.2 Predator Management

See Section 2.4.1.1.2.

The benefit of predator management is that this form of control may promote the long term survival of Sonoran pronghorn. Individuals who value Sonoran pronghorn, or wildlife generally, may receive a benefit either by opportunities to view wildlife or by knowing that these opportunities are available.

One potential cost of predator management is that it may reduce wildlife viewing opportunities. Visitors may find it enjoyable to view predators. Reducing opportunities to view any kind of wildlife may decrease visitor satisfaction.

Some individuals and non-governmental interest groups object to predator control. These individuals and groups will be negatively affected by predator control activities.

2.5.1.1.3 Lesser Long-nosed Bat

See Section 2.1.1.

As described in Section 2.1.1., many visitors to the refuge are attracted by the presence of wildlife, and specifically by the knowledge that threatened or endangered species inhabit the refuge.

This alternative potentially offers a higher level of protection to bats and their maternity roosts than Alternatives 1-3, which provides the social benefit of endangered species protection. This alternative does not necessarily offer increased opportunities for wildlife viewing, and restricts access to maternity roosts. Thus, the benefit is in long term protection of the species rather than visitor observation of the lesser long nosed bat. The negative impact associated with retaining the roost is that the roost is a man-made structure. Evidence of human intervention in wilderness

areas may cause a negative social impact.

Some refuge visitors may be unable to use the bats' roost for protection from the elements under this alternative. This activity may be more likely to be engaged in by illegal visitors to the refuge. However, loss of shelter may cause human suffering, particularly during severe weather events.

2.5.1.1.4 Cactus Ferruginous Pygmy-owl

See Section 2.1.1.

2.5.1.1.5 Desert Pupfish

This activity will provide the social benefits of protecting an endangered species and contributing to the integrity of the Sonoran desert ecosystem.

A refugium for desert pupfish will create additional opportunities for environmental education and interpretation on the refuge. These are recognized purposes for wildlife refuges. Providing these opportunities for refuge visitors will create a social benefit.

2.5.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.5.1.2.1 Developed Waters

Under this alternative, the refuge will implement a program of upgrading existing developed waters in wilderness. This will have the short-term social cost of increasing human caused intrusions into wilderness areas. The sights and sounds of the construction activities may impinge on visitors' sense of solitude. The long term social benefit of upgrading the tanks and installing photovoltaic sensors is that trips to haul water may be less frequent, causing less intrusion into visitors' wilderness experience. If the appearance of tanks is modified to create less visual intrusion, this will confer a benefit by creating less visual disturbance to visitors in wilderness.

Weekly aerial reconnaissance to check water levels may disturb wilderness visitors.

If developing new water sources enhances refuge wildlife, this will provide a social benefit to those who value wildlife. Wildlife dependent activities are essential activities in Cabeza Prieta NWR.

This alternative allows for consideration of development of new water sources, or cessation of water provision in some areas. This decision will be made based on species' response to water availability as determined by research. The decision may have no social effect, other than those noted above, because it will be based on the best available science to support bighorn sheep survival.

2.5.1.2.2 Population Goal

This population goal would provide the benefit of wildlife viewing opportunities for visitors, although at a lower level than would be expected in the absence of human impacts to refuge resources.

Hunting would be allowed at this population level at a slightly higher level than is currently allowed. This provides social benefits to hunters and groups that support hunting. Those opposed to hunting, as individuals or as members of organized groups, would be negatively affected by the hunting implications of this population goal.

2.5.1.2.3 Predator Management

The benefit of predator management is that this form of control may promote the higher numbers of desert bighorn sheep because of reduced predation by both coyotes and mountain lions.

A potential social benefit of the proposed research activities of this alternative is that it would increase the scientific knowledge of predators and predator-prey relationships. This can contribute to more effective scientifically based predator management actions.

One potential cost of predator management is that it may reduce wildlife viewing opportunities. Visitors may find it enjoyable to view predators. Reducing opportunities to view any kind of wildlife may decrease visitor satisfaction.

Some individuals and non-governmental interest groups object to predator control. These individuals and groups will be negatively affected by predator control activities. Others support

predator control. These groups and individuals will be positively affected by predator control activities.

2.5.1.3 Desert Ecosystem Integrity Monitoring

2.5.1.3.1 Migratory Birds

See Section 2.2.1.3.1.

The actions under this alternative expand research and monitoring activities to include more species than those listed in the previous alternatives. An increase in these activities may result in better birding opportunities, thus increasing visitor satisfaction. Opportunities for interpretation and environmental education may be increased if the refuge provides research results to refuge visitors.

2.5.1.3.2 Reptiles and Amphibians

See Section 2.2.1.3.2.

The actions under this alternative expand research and monitoring activities to include more species than those listed in the previous alternatives. An increase in these activities may result in more opportunities to encounter reptiles and amphibians on the refuge, thus increasing visitor satisfaction. Opportunities for interpretation and environmental education may be increased if the refuge provides research results to refuge visitors in formats appropriate to the level of scientific/technical knowledge of visitors.

2.5.1.3.3 Raptors and Ravens

This alternative expands research and monitoring activities to include raptors and ravens. Opportunities for interpretation and environmental education may be increased if the refuge provides research results to refuge visitors.

Inventorying and monitoring raptors and ravens provides social benefits because these activities provide information to refuge managers that can help make refuge management decisions.

2.5.1.3.4 Long-term Desert Integrity Monitoring

See Section 2.4.1.3.3.

2.5.1.3.5 Exotic/Invasive Species

See Section 2.4.1.3.4.

Expanding an exotic/invasive strategy to include coordination with the Mexican government may be socially beneficial because a control program is likely to be more effective if areas beyond the refuge boundaries are included. Controlling invasive species confers the broad social benefit of restoring or enhancing desert ecosystem health.

2.5.1.4 Mule Deer

This program may lead to an increase in opportunities for wildlife viewing, and/or hunting if management actions follow the survey. Wildlife viewing is an important refuge activity, so increasing these opportunities may provide social benefits. Hunting will provide benefits to hunters and hunting groups, but will create a negative impact for those opposed to hunting.

Providing information about this species may provide opportunities for environmental education and interpretation.

2.5.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.5.2.1 Minimum Requirements Analysis

See Section 2.4.2.1.

2.5.2.2 Abandoned Vehicles

See Section 2.4.2.2.

2.5.2.3 Military Debris Removal

See Section 2.4.2.3.

This alternative does not include refuge-developed standards to prioritize tow darts for removal. Potentially, this could mean that tow darts with a negative effect on visitor experience are not prioritized for removal.

2.5.2.4 Administrative Trails

See Section 2.4.4.

Concentrating backcountry hikers and campers on administrative trails will have positive and negative social impacts.

The positive social effect is that reducing physical impacts by concentrating human use in specified areas could help to preserve the wilderness character of areas outside of administrative trails.

The negative social effects are that some visitors seeking wilderness solitude may be less likely to find solitude if they follow the recommendations to hike and camp on administrative trails. Studies have shown an inverse relationship between perceived crowding in wilderness areas and visitor satisfaction, although individuals have differing thresholds for when they feel crowded. Additionally, perceptions of crowding are only one of several variables that affect visitor satisfaction with wilderness (Dawson and Watson 2000).

2.5.2.5 Wilderness Impact Monitoring

See Section 2.3.2.5.

2.5.2.6 Childs Mountain Communications Site

See Section 2.4.2.7.

2.5.3 Goal: Visitor Services Management

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding and protection of the plant, animal and wilderness resources of Cabeza Prieta NWR.

2.5.3.1 Access Management

See Section 2.4.3.1.

This alternative prohibits certain types of vehicles that are not expressly banned by other alternatives. The social value lies in protection of fragile desert resources, and prevention of additional types of noises from vehicle engines. Wilderness solitude is negatively affected by sounds of human-caused activities. The negative social effect is that owners of prohibited vehicles will be unable to access the refuge using these forms of transport.

2.5.3.2 Hunt Program

2.5.3.2.1 Desert Bighorn Sheep

See Sections 2.2.4.2 and 2.4.3.2.1.

2.5.3.2.2 Mule Deer

Hunting has both positive and negative social impacts, as described in Section 2.2.4.2. Allowing a mule deer hunt would amplify both the social benefits and the social costs because it would increase the number of hunters on the refuge. Depending on number of hunting tags and length of the season, expanding the hunt could negatively affect wilderness users' experiences because they may encounter hunters or hear sounds of hunting.

2.5.3.2.4 Predator Hunts

See Section 2.4.1.1.2 for a discussion of the public's perception of predator control activities. Predator hunting is a controversial issue across the country.

2.5.3.3 Leave-No-Trace Program

See Section 2.4.3.3.

2.5.3.4 Environmental Education

See Section 2.4.3.4.

2.5.3.5 Interpretation

See Section 2.2.4.5.

This alternative provides increased opportunities for interpretation from a variety of sources. The net social benefit is likely to include increased visitation, longer visits to the refuge due to increased opportunities in some of the less-remote areas of the refuge, and increased ability to learn about the refuge and refuge resources.

2.5.3.6 Camping

See Sections 2.2.4.6 and 2.3.3.6.

This alternative allows wood burning in some campsites. The social value is that some campers find the campfire experience important to their outdoor experience.

2.5.3.7 Pack and Saddle Stock

See Section 2.2.4.7.

2.5.4 Goal: Cultural Resources Management

Protect, maintain and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations.

2.5.4.1 General Provisions

The general provisions for achieving this goal are addressed as described above in Section 2.1.4 under Elements Common to All Alternatives.

2.5.4.2 Onsite Interpretation

This action will increase opportunities for interpretation, a recognized recreational use for refuges. See Section 2.3.3.5 for a discussion of the value of interpretation. If interpretation of cultural resources is conducted with tribal authority and cooperation, harmful social effects to tribal members are more likely to be avoided.

2.5.4.3 Site Stabilization/Patrols

Protecting cultural resources provides a social value to tribal members and others interested in maintaining these historically important places.

If stabilization activities are conducted with tribal authority and cooperation, harmful social effects to tribal members are more likely to be avoided.

2.5.4.4 Training

This activity will increase protection of cultural resources, providing a social benefit to tribal members and others interested in preserving cultural resources in the face of border protection activities. This training may also reduce conflict between tribal members and government officials.

2.6 ALTERNATIVE 5: MAXIMUM EFFORT

This alternative emphasizes active management aimed at increasing the size of the refuge desert bighorn sheep population and also enhancing the refuge visitor experience. An assumption basic to this alternative is that desert bighorn abundance was historically much greater in the region prior to habitat fragmentation, groundwater withdrawals, surface water diversion and the introduction of diseases carried by domestic livestock. In view of this assumption, a population goal established for desert bighorn sheep reflects the densities observed in the better stocked existing habitats in the region today. This density is considered a component of refuge wilderness character.

Under this alternative 8921 visitor days would be expected. Of these, 8656 would be recreational visitor days and 265 hunter visitor days. The increase in visitation would be anticipated because of increased hunting opportunities (big game and small game), increased interpretation in close proximity to the visitors' center, and increased access to the refuge due to road paving, and the ability of off road vehicles to use refuge roads.

2.6.1 Goal: Wildlife and Habitat Management

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta NWR.

2.6.1.1 Endangered and Threatened Species

The refuge will continue to participate in recovery of endangered and threatened species as described above in Section 2.1.1 under Elements Common to All Alternatives, with the following additions.

2.6.1.1.1 Sonoran Pronghorn Population Monitoring

See Section 2.1.1.1.1. The increased number of population surveys may affect visitors' perceptions of wilderness solitude.

2.6.1.1.2 Sonoran Pronghorn Developed Waters

See Section 2.5.1.1.1.

The option of increasing the number of developed waters for Sonoran pronghorn could lead to increased population levels. Should this occur, wildlife viewing opportunities may increase. Other positive impacts would be the social value of contributing to the recovery of an endangered species.

The negative effects of this action would be the visual intrusion of water tanks and the visual and sound intrusion of water hauling activities.

2.6.1.1.3 Forage Enhancement

See Section 2.1.1.

2.6.1.1.4 Predator Management

See Section 2.5.1.1.2.

2.6.1.1.5 Lesser Long-nosed Bat

See Section 2.5.1.1.3.

2.6.1.1.5 Cactus Ferruginous Pygmy-owl

See Section 2.5.1.1.4.

2.6.1.1.7 Desert Pupfish

See Section 2.5.1.1.5.

2.6.1.2 Desert Bighorn Sheep

Conservation of the desert bighorn sheep was central to the purpose of creation of Cabeza Prieta NWR. Sheep occupy all of the mountain ranges within the refuge.

2.6.1.2.1 Developed Waters

See Section 2.5.1.2.1.

This alternative would provide additional waters for desert bighorn sheep. If this leads to increased desert bighorn sheep populations, and a corresponding increase in number of hunt permits, this would provide a benefit for hunters.

Visitor satisfaction with wildlife viewing activities may increase if the desert bighorn sheep

population increases.

Activities associated with water hauling and provision (noise and visual intrusion) could have a negative impact on visitor experience.

2.6.1.2.2 Forage Enhancement

If forage enhancement increases numbers of desert bighorn sheep, hunting opportunities may increase. Visitor satisfaction with wildlife viewing experiences may increase. The visual impacts of forage enhancement plots may be positive (visitors may learn about forage management) or negative (visitors may perceive that the plots intrude on their visual experience).

2.6.1.2.3 Population Goal

This population goal would provide the benefit of wildlife viewing opportunities for visitors at a higher frequency than the current conditions.

Hunting would be allowed at this population level. This provides social benefits to hunters and groups that support hunting. Those opposed to hunting, as individuals or as members of organized groups, would be negatively affected by the hunting implications of this population goal.

2.6.1.2.4 Predator Management

See Section 2.5.1.2.3.

This alternative adds the possibility of a public predator hunt if studies determine that predation is negatively affecting desert bighorn sheep populations. The benefit of this hunt could be the protective effect for desert bighorn sheep and the provision of hunting opportunities on the refuge. Those who support predator hunting would be positively affected by this alternative.

The negative effects would be related to public opposition to predator hunts. This opposition is fairly widespread around the United States and may be an issue if a public predator hunt is proposed for the refuge.

2.6.1.3 Desert Ecosystem Health

2.6.1.3.1 Migratory Birds

See Section 2.5.1.3.1. This alternative includes species not considered in other alternatives. Social benefits may be slightly greater than those listed in Section 2.5.1.3.1.

2.6.1.3.2 Raptors and Ravens

See Section 2.5.1.3.3.

2.6.1.3.3 Reptiles and Amphibians

See Section 2.5.1.3.2.

2.6.1.3.4 Long-term Desert Integrity Monitoring

See Section 2.5.1.3.4.

A greatly increased scope of research on refuge resources will provide important information for managers. This has the long-term social value of increasing the knowledge base for management decisions. The short-term social cost is the expense and staff requirements for this effort. A potential social effect is the potential for intrusion on cultural resources. Large scale monitoring efforts could disturb cultural sites or could intrude on areas considered sacred to tribal members.

2.6.1.3.5 Exotic/Invasive Species

See Section 2.5.1.3.5.

2.6.1.4 Game Animals

One social benefit of this activity is that it helps to establish hunt numbers, which can benefit hunters. Other, more diffuse benefits accrue because a population survey helps managers make better-informed decisions with increased levels of knowledge about refuge resources.

2.6.2 Goal: Wilderness Stewardship

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

2.6.2.1 Minimum Requirements Analysis

See Section 2.1.3.1.

2.6.2.2 Abandoned Vehicles

See Section 2.2.2.1.

2.6.2.3 Military Debris Removal

See Section 2.2.3.3.

2.6.2.4 Administrative Trails

See Sections 2.2.3.3 and 2.5.2.4.

2.6.2.5 Wilderness Impact Monitoring

See Section 2.3.2.5.

2.6.2.6 Childs Mountain Communications Site

See Section 2.2.3.4.

2.6.3 Goal: Visitor Services Management

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding and protection of the plant, animal and wilderness resources of Cabeza Prieta NWR.

2.6.3.1 Access Management

See Section 2.5.3.1.

This alternative would allow increased refuge access by a greater variety of types of vehicles. Projections show that recreational visitor-days under this alternative would increase by approximately 425 annually. The effect of allowing off road vehicles and motorcycles could be that more visitors would travel on refuge roads. This would be a benefit for these new users but could degrade the wilderness experience of others because of noise and increased density of visitors. Wildlife viewing opportunities could be affected if the noise of vehicles caused wildlife disturbances.

Allowing two wheel drive vehicles on a new road loop in the non-wilderness portion of the Childs Valley, and maintaining the Charlie Bell Road to a standard allowing use of ordinary passenger cars at low speed would also increase visitor numbers. This could allow more opportunities for refuge access but could impair some visitors' experiences because of noise and visual intrusion.

2.6.3.2 Hunt Program

2.6.3.2.1 Desert Bighorn Sheep

See Section 2.2.4.2.

2.6.3.2.2 Mule Deer

See Section 2.5.3.2.2.

2.6.3.2.3 Small Game

Allowing a small game hunt would likely increase visitation on the refuge. This would have both positive and negative impacts on the refuge and on visitor experiences, particularly wilderness experiences.

Society is divided on the issue of hunting, and some oppose hunting on refuges. Others support refuge hunting of small game and would be positively affected if this were allowed in Cabeza Prieta NWR.

2.6.3.2.4 Predators

See Section 2.5.3.2.4. Predator hunts are likely to increase visitation. Increasing visitation in a refuge that is primarily wilderness will affect visitor experiences.

2.6.3.3 Leave-No-Trace Program

See Section 2.5.2.5.3.3.

2.6.3.4 Environmental Education

See Section 2.5.3.4.

2.6.3.5 Interpretation

See Section 2.5.3.5.

2.6.3.6 Camping

See Section 2.5.3.6.

Three primitive campsites would be added under this alternative. Because the impact of implementing this alternative is increased visitor numbers, more campsites would be necessary.

2.6.3.7 Pack and Saddle Stock

See Section 2.5.3.7.

2.6.4 Goal: Cultural Resources Management

Protect, maintain and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations.

2.6.4.1 General Provisions

This goal is addressed as described above in Section 2.1.4 under Elements Common to All Alternatives.

2.6.4.2 Onsite Interpretation

See Section 2.5.4.2.

2.6.4.3 Site Stabilization/Patrols

See Section 2.5.4.3.

2.6.4.4 Inventory

This action may increase the social benefits for the Tohono O'odham tribe by adding to tribal knowledge about locations of cultural sites. If the investigation is not conducted in accordance with tribal protocol and with tribal approval, this will create a negative impact for the tribe.

2.6.4.5 Training

See Section 2.5.4.4.

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Appendix L: Regional Economic Effects of Current and Proposed Management Alternatives for Cabeza Prieta National Wildlife Refuge

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Introduction

The National Wildlife Refuge System Improvement Act of 1997 requires all units of the National Wildlife Refuge System to be managed under a Comprehensive Conservation Plan (CCP). The CCP must describe the desired future conditions of a Refuge and provide long range guidance and management direction to achieve Refuge purposes. Cabeza Prieta National Wildlife Refuge (NWR), located in Arizona is in the process of developing a range of management goals, objectives, and strategies for the CCP. The CCP for Cabeza Prieta NWR must contain an analysis of expected effects associated with current and proposed Refuge management strategies.

The purpose of this study was to provide the economic analysis needed for the Cabeza Prieta NWR CCP by evaluating the regional economic impacts associated with the Cabeza Prieta NWR CCP management strategies. For Refuge CCP planning, an economic impact analysis describes how current (No Action Alternative) and proposed management activities (alternatives) affect the local economy. This type of analysis provides two critical pieces of information: 1) it illustrates a refuge's true value to the local community; and 2) it can help in determining whether local economic effects are or are not a real concern in choosing among management alternatives.

There are five alternatives evaluated in the CCP. Alternative 1, (No Action) describes the current management activities at the Refuge. These programs and activities would continue if none of the action alternatives (Alternatives 2 through 5) were adopted. Current management activities (Alternative 1) are focused on recovery of the endangered Sonoran pronghorn, maintaining the populations of desert bighorn sheep, monitoring nongame wildlife species, monitoring and controlling invasive species, protecting wilderness character, and providing visitors with quality wildlife-dependant recreational experiences that are compatible with the refuge purposes. Alternative 2 (minimum invention) features an approach to Refuge management that minimizes active intervention on ecological processes, particularly within the Refuge wilderness areas. Alternative 3 (restrained intervention) focuses on providing a minimal level of active management intervention on natural processes at the Refuge. Alternative 4 (active management) emphasizes maintaining ecological integrity on the Refuge and protecting the Refuge's wilderness character. Alternative 5 (maximum effort) emphasizes active management aimed at increasing the size of the Refuge desert bighorn sheep population and also enhancing the Refuge visitor experience.

This report first provides a description of the local community and economy near the Refuge. An analysis of current and proposed management strategies that could affect the local economy is then presented. The Refuge management activities of economic concern in this analysis are Refuge personnel staffing and Refuge spending within the local community, and spending in the local community by Refuge visitors.

Regional Economic Setting

Cabeza Prieta NWR is located in Yuma and Pima Counties in southwestern Arizona. The Mexican State of Sonora is located immediately south of the Refuge. Geographically, 60% of the refuge lies

in southeastern Yuma County while 40% lies in western Pima County. The refuge headquarters is located on the northern edge of the town of Ajo, in Pima County.

Pima County - is situated in the central portion of southern Arizona, bordering Mexico to the south, Maricopa and Pinal Counties to the north, Santa Cruz and Cochise Counties to the east, and Yuma County to the west. Pima County covers 9,184 square miles, consisting of Tucson metropolitan center and scattered satellite communities in outlying areas. Most of Pima County's economic and population base is concentrated in eastern Pima County in the greater Tucson area. The San Xavier, Pascua Yaqui, and Tohono O'odham Nation lands together account for 42.1%, State lands 14.9%, public lands 29.2% and private lands 13.8% of Pima County's land base (Arizona Department of Commerce 2002).

By the 1950s, the rural and small town setting of Pima County had changed. Agriculture, ranching, and mining activities slowed considerably as educational, medical, and defense-funded research and manufacturing in metropolitan Tucson began to develop and expand (Arizona Department of Commerce 2002). Arizona's mild climate and relatively inexpensive cost of living also served to attract people to the area. Land development as a result of the influx of residents further changed and diversified the economic structure of the county.

Smaller rural communities in western Pima County near the refuge, including Ajo and Why, have developed a separate and distinct economic structure from eastern Pima County. Historically, western Pima County was heavily dependent on large-scale mining operations (Ajo Community Comprehensive Plan 2001). In recent years, however, the economy has been adversely affected by the loss of mining activities in the immediate area, and the collapse of the Gulf of California shrimp industry in Mexico. In an attempt to revive the sluggish economy, recreation and tourism have been increasingly marketed as replacements to lost industries (Ajo Community Comprehensive Plan 2001).

Ajo - The town of Ajo is located immediately to the east of the eastern boundary of the refuge with its major access road being Highway 85. Until the mid 1980's Ajo was historically heavily dependent on mining operations for economic stability. In 1984, Phelps Dodge shut down the mine and smelter operation due to a drastic reduction in the value of copper and labor dispute problems (Ajo Community Comprehensive Plan 2001). In order to replace lost mining employment and revenues, the town has marketed itself to retirees and tourists to capitalize on Ajo's mild winters and close proximity to Cabeza Prieta NWR and Organ Pipe Cactus National Monument. According to the Ajo Community Comprehensive Plan (2001), many residents feel the key to Ajo's survival lies in converting the town into a retirement community and tourist center.

Yuma County- is situated in the southwestern corner of Arizona, bordering Mexico to the south, California to the west, La Paz County to the north, and Maricopa and Pima counties to the east. Yuma County covers 5,522 square miles of desert land accented by rugged mountains. The valley regions contain an abundance of arable land, irrigated with water from the Colorado River. Yuma County's economy is centered on its hot, dry climate, its location along the Colorado River, and its location midway between the metropolitan areas of southern Arizona and southern California. Agriculture, tourism, military and government are the County's principal industries (Arizona Department of Commerce 2002). Major communities near the Refuge include Yuma and Welton. Public lands account for 81.6%, State lands, 7.7%, Native American Nation lands 1.2%, and private land 10.5% of Yuma County's land base.

The Tohono O'odham Nation– The Nation of the Tohono O'odham consists of four separate reservation lands. The largest, known as the Tohono O'odham reservation stretches 90 miles across Pima County, covering 2,773,357 acres and lies immediately to the east of the town of Ajo and the Refuge. Two principal economic activities on the Tohono O'odham Nation lands include

employment by federal, state, and tribal agencies, and cattle ranching and related activities. Growth in tourism, agricultural, retail/tourism, and utilities sectors are expected as tribal development plans are implemented (Arizona Department of Commerce 2002). Proposed development projects will also provide jobs in construction as new housing units, a shopping center, a gaming center, mining and chemical concerns, and several tourism facility projects are planned (Arizona Department of Commerce 2002). A gaming facility was constructed in 1999 for the Gu Vo district located in the western region of the nation's lands.

Mexico – The Mexican state of Sonora is located immediately south of the refuge. Northwestern Sonora is sparsely populated, with inhabitants located in small communities or scattered on many cooperative and private farms that cover the state. The northwestern part of Sonora immediately adjacent to Organ Pipe Cactus NM is included in the Municipio of Plutarco Elias Calles. The Municipio includes the town of Sonoyta approximately 2 miles south of Lukeville, near the United States border.

The ease of access between Puerto Penasco and Arizona (via State Route 85) creates a tight symbiotic relationship through the export of shrimp from Mexico to Phoenix and Tucson, and tourism in the Gulf of Mexico resulting from devaluation of the peso in 1980 (Arizona Department of Commerce 2002). In recent years, however, the shrimp industry has collapsed as a result of continuous over harvesting. Tourism businesses have suffered losses as inflation has countered low prices for goods and services that followed the peso's devaluation.

Population, Employment, and Income

Population

The 2000 Census estimated Pima County's population at 843,746 and Yuma County's population at 160,026 (Table 1). Sixteen percent of Arizona residents resided in Pima County while three percent resided in Yuma County (US Census Bureau). As shown in Table 1, both Pima and Yuma County experienced a population increase from 1990 to 2000 of 26.5% and 49.7% respectively, however, Yuma County experienced a higher increase than the 40% population increase for the State of Arizona (US Census Bureau).

Table 1. Regional and Local Population Estimates

Population			
	1990	2000	% Change
Arizona	3,665,228	5,130,632	40.0%
Pima County	666,880	843,746	26.5%
Yuma County	106,895	160,026	49.7%
Communities near Cabeza Prieta NWR			
Ajo	2,919	3,705	26.9%
Tohono O'odham Reservation	18,730	10,787	-42.4%
Welton	1,066	1,829	71.6%
Yuma	54,923	77,515	41.1%

Source: US Census Bureau and Arizona Department of Economic Security

As shown in Table 1, of the local communities surrounding the Refuge, Welton experienced the largest population increase of 71.6% while the Tohono O'odham Nation experienced the only

population decrease of 42.4% from 1990 to 2000 (US Census Bureau). Subsequent to the closure of the mining operations in 1984, Ajo's population decreased by 56% from 5,189 to 2,919 from 1980 to 1990 (Arizona Department of Security 2001). Between 1990 and 2000, the population increased 26.9% as retirees have continued to move to Ajo (US Census Bureau). Since 1986, nearly 900 houses once owned by Phelps Dodge have been sold to new residents, mostly retirees (Arizona Department of Commerce, 2002).

Population composition percentages are presented in Table 2. In spite of the high proportion of non-native and non-Hispanic newcomers, the multicultural flavor of Pima and Yuma County still remains. According to the 2000 Census, 29% of Pima County and 50.5% of Yuma County's residents are of Hispanic or Latino origin, compared to the state average of 25.3% and the national average of 12.5% (Table 2).

Table 2. Population Composition for the Year 2000.

				Communities near Cabeza Prieta NWR			
	Arizona (%)	Pima County (%)	Yuma County (%)	Ajo (%)	Tohono O'odham Reservation (%)	Welton (%)	City of Yuma (%)
White	75.5	75.1	68.3	83.0	8.7	70.6	71.7
Black or African American	3.1	3.0	2.2	0.6	0.3	2.1	3.8
American Indian and Alaska Native	5.0	3.2	0.2	9.7	90.8	2.1	2.2
Asian	1.8	2.0	0.1	0.6	0.2	0.5	2.1
Native Hawaiian and Other Pacific Islander	0.1	0.1	0.0	0.2	0.2	0.4	0.3
Persons reporting some other race	11.6	13.3	23.6	10.8	0.9	27.2	23.9
Persons of Hispanic or Latino origin	25.3	29.3	50.5	37.6	7.1	40.7	45.7
White persons not of Hispanic/Latino origin	63.8	61.5	44.3	54.4	92.9	55.3	47.5

Source: US Census Bureau

Employment and Income

Employment status statistics for 2000 are presented in Table 3. In 2000, the 4.6% unemployment rate in Pima County was very close to the State average of 4.4% while the 6.1% unemployment rate for Yuma County was considerable higher than the State average (US Census Bureau). The Tohono O'odham Nation's 9.9% unemployment rate was more than triple the State average in 2000. According to the Arizona Department of Commerce (2001), additional Tohono O'odham Nation jobs are expected to result from new tribal development plans and construction activities on the reservation. Due to the large number of retired residents, 64.4% of Ajo's and 66.1% of Welton's population were not in the 2000 labor force (Table 3). In the city of Yuma, the Marine Corps Air Station and US Army Yuma Proving Grounds accounted for 5.4% of the 2000 labor force.

Table 3. Employment Status in 2000

				Communities near Cabeza Prieta NWR			
	Arizona (%)	Pima County (%)	Yuma County (%)	Ajo (%)	Tohono O'odham Reservation (%)	Welton (%)	Yuma City (%)
Population in labor force	62.9	61.8	59.1	35.6	41.2	33.9	59.6
Employed	57.6	56	47.3	32.2	31.3	29.5	49.3
Unemployed	4.4	4.6	6.1	3.3	9.9	4.4	4.9
Armed Forces	0.9	1.2	5.7	0.1	0	0	5.4
Not in labor force	37.1	38.2	40.9	64.4	58.8	66.1	40.4

Source: US Census Bureau

Employment occupation trends for 2000 are presented in Table 4. The 2000 employment occupational structure for Pima County closely matched the overall State occupational structure. In Yuma County, agricultural based employment accounts for a larger percent of employment as compared to Pima County and the State of Arizona (US Census Bureau). According to the Arizona Department of Commerce (2001), agriculture is a major economic factor in Yuma County and at the current rate of growth for Yuma-area agribusiness is expected to soon become a billion dollar industry.

Table 4. Regional and Local Employment Occupation for the Year 2000

				Communities near Cabeza Prieta NWR			
	Arizona (%)	Pima County (%)	Yuma County (%)	Ajo (%)	Tohono O'odham Reservation (%)	Welton (%)	Yuma City (%)
Management, professional, and related occupations	32.7	35	26.7	23.9	23.4	20.7	30.2
Service occupations	16.2	17.6	17.7	28.8	25.7	17.5	18.8
Sales and office occupations	28.5	27.1	26.4	25.5	24	26.9	28.7
Farming, fishing, and forestry occupations	0.6	0.2	6.3	0	1.2	9.2	2.5
Construction, extraction, and maintenance occupations	11	10.7	10.7	10	13.7	9	9.8
Production, transportation, and material moving occupations	10.9	9.4	12.2	11.8	12	16.8	10

Source: US Census Bureau

According to the Arizona Department of Commerce (2002), federal, state, and tribal agencies are the largest employers on the Tohono O'odham Nation, with cattle ranching forming the second most important employment source. The agricultural, retail-tourism, utilities, and construction sectors are expected to grow as tribal plans are implemented (Arizona Department of Commerce 2002).

In 1980, 60% of Ajo's population was employed by the Phelps Dodge Corporation (Arizona Department of Commerce, 2002). Following the closure of the mining operations in 1984, employment in Ajo decreased by more than sixty percent from a labor force of 1,902 to 751 workers

from 1980 to 1990. To accommodate the increasing demand in the retirement and tourist industries in Ajo, the services sector has accounted for a majority of the shift in the employment base (Arizona Department of Commerce 2002). In 1999, Ajo's principal employment was in the tourist, service and commercial sectors (Arizona Department of Commerce 2002).

The income and poverty status for 2000 is presented in Table 5. Per capita income is the mean income computed for every man, woman, and child in a geographic area (US Census Bureau). Individuals are classified as below poverty if their total income was less than the poverty threshold (US Census Bureau). In 2000, the US Census poverty threshold for an individual under 65 years old was set at $8,667 (Table 5). In 2000, 46.4% of the Tohono O'odham Nation residents were classified as below poverty while the State average was 13.9%. In 2000, the Tohono O'odham per capita income was $6,998, the State average was $ 20,275 (Table 5). According to the US Census estimates, the Tohono O'odham Nation is severely impoverished.

Table 5. Regional and Local Income and Poverty Status for the Year 2000.

				Communities near Cabeza Prieta NWR			
	Arizona	Pima County	Yuma County	Ajo	Tohono O'odham Reservation	Welton	Yuma City
Per capita income	$20,275	$19,785	$14,802	$14,548	$6,998	$13,644	$16,730
Percent of individuals below poverty level	13.9%	14.7%	19.2%	22.3%	46.4%	21.3%	14.7%

Source: US Census Bureau

Yuma County's 2000 per capita income of $ 14,802 was well below Pima County's per capita income of $19,785 and the State average of $20, 275 (US Census Bureau). In 2000, Ajo's per capita income was $5,237 lower than the per capita income of Pima County (Table 5). According to the Ajo Community Comprehensive Plan (2001), the lack of economic opportunities results in many young adults leaving Ajo after high school and many of those that stay are low skilled workers with little educational opportunities to advance their careers. This steady increase in services employment is generally reflected in lower paying jobs and lower household income.

Mexico - The community of Sonoyta Mexico, part of the Municipio of Plutarco Elias Calles, is located approximately 2 miles south of Lukeville, near the United States border. In 2000, the Municipo had a reported population of 11,278 and a population increase of 1.5% between 1990 and 2000 (INEGI 2002). Approximately 80% of the population is located in the urban area of Soynota, and the remaining population occupies the surrounding agricultural areas. In 1995, the economic structure of Sonoyta consisted of approximately 60% commercial and industrial services, 20% financial and other services. Tourism is a major component of the economic structure of the community; however, American visitors traveling to and from the Gulf areas contribute to only a part of tourism revenues received by the community. Of at least equal or greater importance than Sonoyta's tourist industry is the town's position along the major Mexican highway between the large population centers in Baja California and interior Mexico.

Modeling the Economic Impacts of Current and Proposed Management Activities

Special interest groups and local residents are quick to criticize a change in refuge management especially if there is a perceived negative impact to the local economy. Having objective data on income and employment impacts often show that these economic fears are drastically overstated.

Quite often, these residents do not realize the extent of economic benefits a refuge provides to a local community. Spending associated with refuge recreational activities such as wildlife viewing and hunting can generate considerable tourism activity for the regional economy. Refuge personnel typically spend considerable amounts of money purchasing supplies in the local lumber and hardware stores, repairing equipment and purchasing fuel at the local service stations, as well as reside and spend their salaries in the local community.

For refuge CCP planning, an economic impact analysis describes how current (No Action Alternative) and proposed management activities affect the local economy. Economic impacts are typically measured in terms of number of jobs lost or gained, and the associated result on employment and income. Economic input-output models are commonly used to determine how economic sectors will and will not be affected by demographic, economic, and policy changes. This type of analysis provides two critical pieces of information: 1) it illustrates a refuge's true value to the local community; and 2) it can help in determining whether local economic effects are or are not a real concern in choosing among management alternatives.

The economic impacts of the management alternatives for Cabeza Prieta NWR were estimated using IMPLAN, a regional input-output modeling system developed by the USDA Forest Service (Minnesota IMPLAN Group 2002). IMPLAN is a computerized database and modeling system that provides a regional input-output analysis of economic activity in terms of 10 industrial groups involving as many as 528 sectors (Olson and Lindall, 1996). IMPLAN estimates for employment include both full time and part time workers which are measured in total jobs.

A region (and its economy) is usually defined as the area within 30 miles of a refuge. Cabeza Prieta NWR is located in Yuma and Pima Counties. Most of the local spending by refuge staff and visitors occurs within the town of Ajo, located in Pima County. Typically, IMPLAN models are built using county level data files, but zip code level files are also available. Most of Pima County's economic and population base is concentrated in eastern Pima County in the greater Tucson area. Smaller rural communities in western Pima County near the refuge, including Ajo, have developed a separate and distinct economic structure from eastern Pima County. Because the economic base of Pima County does not represent the local economic base surrounding the Refuge, the town of Ajo will serve as the main economic impact region for estimating the economic impacts associated with the management of Cabeza Prieta NWR. The year 2000 Ajo Zip Code level file and the state level IMPLAN data file were used in this study. The IMPLAN employment data estimates were comparable to the US Department of Commerce, Bureau of Economic Analysis, and Regional Economic Information System data at the 1 digit Standard Industrial Code level for the year 2000.

Refuge Management Activities

For the current conditions, (Alternative 1) staffing at the Refuge consists of twelve full time employees consisting of: one Project Leader; one Deputy Project Leader; two Wildlife Biologists; two Outdoor Recreation/Outreach personnel; three Law Enforcement Officers; two Maintenance Workers; and one Office Assistant. According to Refuge budgeting estimates for 2004, the current staff accounts for an annual payroll (including salaries and benefits) of $832,837. In addition to providing salaries and benefits, the Refuge estimates goods and services purchases totaling $415,200 for 2004, approximately 15% of which will be spent locally in the Ajo economy.

Table 6 shows the additional proposed staffing needs for Alternatives 2, 3, 4, and 5. Additional annual funding needed for the proposed personnel/staffing (including benefits) is anticipated to cost $32,670 for Alternative 2, $119,790 for Alternative 3, $168,190 for Alternative 4, and $264,990 for Alternative 5.

Table 6. Proposed Additional Staffing Needs for Alternatives 2, 3, 4, and 5.

Alternative 2	Outdoor Recreation Planner or Office Assistant GS-5/6
Alternative 3	Wildlife Biologist, GS-9 Maintenance Worker, WG-10
Alternative 4	Wildlife Biologist, GS-9 Maintenance Worker, WG-10 Law Enforcement Officer GS-9
Alternative 5	Wildlife Biologist, GS-9 Wildlife Biologist, GS-9 Maintenance Worker, WG-10 Law Enforcement Officer GS-9 Outdoor Recreation Planner GS-9

For Alt 2 (Min. Intervention), annual nonsalary expenditures are anticipated to be reduced by 10% as compared to Alternative 1. This reduction accounts for considerable decreases in refuge maintenance in the field, but an increase in operational hours at the visitor center. Annual nonsalary expenditures are anticipated to increase by 10% for Alt 3 (Restrained Intervention) to fund the additional sheep monitoring called for in this alternative. Annual nonsalary expenditures are anticipated to increase by 25% for Alt 4 (Proposed Alternative) to reflect an increased level of effort to construct improved water catchments and small increases in monitoring. For alternative 5 (Maximum Intervention),
annual nonsalary expenditures are anticipated to be double the level of Alternative 1. This increase reflects considerable increases in desert bighorn sheep monitoring, development of new water catchments (beyond the improvements to existing catchments proposed in Alt 4), and road improvements to the Copper Canyon Loop.

For each alternative, it is assumed that approximately 15% of nonsalary expenditures will still be spent locally in the Ajo economy. Table 7 summarizes the anticipated annual nonsalary and salary expenditures by management alternative.

Table 7. Refuge Staffing and Budgeting Expenditures by Management Alternative

	Annual Expenditures by Alternative				
	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Salary	$832,837	$865,507	$952,627	$1,001,027	$1,097,827
Non-salary	$415,200	$373,680	$456,720	$519,000	$830,400
Total	$1,248,037	$1,239,187	$1,409,347	$1,520,027	$1,928,227

Economic Impacts Associated with Refuge Management

Because of the way industries interact in an economy, a change in the activity of one industry affects activity levels in several other industries. For example, an increase in funding could allow the Refuge to start new projects or hire additional staff members. This added revenue will directly flow to the businesses from which the Refuge purchases goods and services and to the new Refuge employees. As additional supplies are purchased or as new staff members spend their salaries within the community, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from Refuge purchases and Refuge employees' spending of salaries locally represents the *direct* effects of Refuge management activities within Ajo. In order to increase supplies to local businesses, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the *indirect* effects of Refuge management activities within the county. The input supplier's new employees use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the *induced* effect of visitor spending. The sums of the direct, indirect and induced effects describe the total economic effect of Refuge management activities in Ajo.

Table 8 shows the economic impacts associated with current and proposed management staffing. IMPLAN estimates for employment include both full time and part time workers, which are measured in total jobs. The current level (Alternative 1) of Refuge personnel directly accounts for 12 jobs and $547,805 in personal income in the Ajo economy. The associated indirect and induced effects generate an additional 3.5 jobs and $96,264 in personal income throughout the Ajo economy for a total economic impact of 15.5 jobs and $664,069 associated with the current level of Refuge personnel. Due to the increased staffing levels for Alternatives 2, 3, 4, and 5 (Table 8), the associated economic effects generate more jobs and income than Alternative 1. Discrepancies between the IMPLAN modeling results on the direct impacts of Refuge staffing and the proposed number of staff for each alternative (Table 6) are primarily attributable to the low wages associated with the proposed staffing needs relative to the average income of nonmilitary federal employees in Ajo.

Table 8. Impacts of Refuge Staffing Expenditures in the Ajo Economy

Ajo Economy	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
		Salary Impacts *(excludes benefits)*			
Direct Effects *(Federal Government Sector)*					
Income ($/year)	$547,805	$569,293	$626,598	$658,433	$722,104
Jobs	12	12.6	13.8	14.5	15.9
Indirect and Induced Effects *(in Ajo Economy)*					
Income ($/year)	$96,264	$100,071	$110,144	$115,740	$126,932
Jobs	3.5	3.6	4	4.2	4.6
Total Effects					
Income ($/year)	**$644,069**	**$669,364**	**$736,742**	**$774,173**	**$849,036**
Jobs	**15.5**	**16.2**	**17.8**	**18.7**	**20.5**

Refuge personnel spend money purchasing supplies in the local lumber and hardware stores, repairing equipment and purchasing fuel at the local service stations. Table 9 shows the economic impacts associated with current and proposed management nonsalary spending in Ajo. For each alternative, it is assumed that 15% of the nonsalary expenditures reported in Table 7 are spent locally in the Ajo economy. The current level (Alternative 1) of Refuge nonsalary expenditures directly accounts for 1 job and $27,924 in personal income. The associated indirect and induced effects generate an additional less than one half of a job (0.4) and $11,511 in personal income throughout the Ajo economy for a total economic impact of 1.4 jobs and $39,435 associated with the current level of Refuge nonsalary spending in the local economy. Because there is a 10% decrease in the nonsalary expenditures for Alternative 2, the associated economic effects generate slightly less jobs and income than Alternative 1. Due to the increased non-salary spending levels for Alternatives 3, 4, and 5 (Table 7), the associated economic effects generate more jobs and income than Alternative 1.

Table 9. Economic Impacts of Refuge Non Salary Expenditures in Ajo.

Ajo Economy	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
			Non Salary Impacts		
			(15% of total non salary expenditures spent locally)		
Direct Effects *(in General Merchandise and Auto Repair/Service Industries)*					
Income ($/year)	$27,924	$25,132	$30,716	$34,905	$55,848
Jobs	1.0	0.9	1.1	1.3	2.1
Indirect and Induced Effects *(in Ajo Economy)*					
Income ($/year)	$11,511	$10,359	$12,662	$14,388	$23,021
Jobs	0.4	0.3	0.4	0.5	0.7
Total Effects					
Income ($/year)	**$39,435**	**$35,491**	**$43,378**	**$49,293**	**$78,869**
Jobs	**1.4**	**1.2**	**1.5**	**1.8**	**2.8**

Table 10 presents the combined economic impacts associated with refuge staffing and non salary spending in Ajo. Refuge management activities currently generate 16.9 jobs and $683,504 in personal income in Ajo and account for 0.88% of total income and 1.19% of total employment in Ajo. Because of increases in staffing, Alternatives 2, 3, 4, and 5 would generate more jobs and income than Alternative 1. However, even though more jobs and income are generated, the overall impact on the Ajo economy is not significant.

Table 10. Combined Refuge Staffing and Non Salary Expenditures in the Town of Ajo.

Ajo Economy	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total Refuge Staffing and Budgeting Impacts *(salary and non-salary)*					
Direct Effects					
Income ($/year)	$575,729	$594,425	$657,314	$693,338	$777,952
Jobs	13.0	13.5	14.9	15.8	18.0
Indirect and Induced Effects *(in Ajo Economy)*					
Income ($/year)	$107,775	$110,430	$122,806	$130,128	$149,953
Jobs	3.9	3.9	4.4	4.7	5.3
Total Effects					
Income ($/year)	**$683,504**	**$704,855**	**$780,120**	**$823,466**	**$927,905**
Jobs	**16.9**	**17.4**	**19.3**	**20.5**	**23.3**
% of Total Ajo Income	*0.88%*	*0.91%*	*1.00%*	*1.06%*	*1.19%*
% of Total Ajo Employment	*1.19%*	*1.22%*	*1.36%*	*1.44%*	*1.64%*

Recreation Activities

Cabeza Prieta NWR offers visitors a variety of recreation and educational opportunities. The visitor center and short interpretive trail near the refuge office offers an introduction to the ecology of the Sonoran desert. For the well prepared, the Refuge offers plentiful hiking, photography, wildlife observation, and primitive camping opportunities. Over 90 percent of the refuge was designated as wilderness by the 1990 Arizona Wilderness Act. To help maintain the wilderness character of the Refuge, no vehicle traffic is allowed except on designated public use roads. A limited number of desert bighorn sheep hunting permits provide a few hunters a high quality desert wilderness hunting experience.

Spending associated with recreational and tourism activities can generate considerable economic benefits for the local and state economy. A tourist usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, food, supplies, and gasoline. The following analysis of spending by Cabeza Prieta NWR visitors will address: the impact of spending by non-local recreation visitors (those living outside of the Ajo area) on the Ajo economy; the impact of spending by non resident recreation visitors (those living outside of Arizona) on the larger statewide economy; and the impact of spending Refuge hunter visitors on the Ajo economy.

Economic Impacts Associated with Visitor Spending

The economic impacts associated with spending by Refuge visitors are estimated by the following equation:

Number of Refuge visitors*average spending* regional multiplier = Economic Impact

For the purposes of this analysis, Cabeza Prieta NWR annual visitation estimates from the year 2001 were used as the base visitation estimates. Results from the 2002 visitor survey (Burkardt et. al. 2003) on visitor spending provide the average spending per visitor day. The IMPLAN modeling system was used to derive the multipliers that capture the secondary (indirect and induced) effects needed to determine the economic impacts of visitor spending.

Refuge visitation records account for visitors on a per day basis. In 2001, annual visitation consisted of 19,515 visitor days. A majority of these visits (11,709) were brief stops at the visitor center, 7,806 were recreation (wilderness area) visitor days and 240 were hunter visitor days. For the purposes of the visitor spending analysis, visitor center visitor days are not included because these brief visits are typically incidental or a spur of the moment stops by people passing through the Ajo area. Table 11 presents the current and anticipated average annual visitation for recreational and hunter visitation by management alternative.

Table 11. Anticipated Number of Visitor Days by Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Recreation Visits	7806	7771	7771	8231	8656
Big Game Hunting	240	0	85-240	265	265
Total	**8046**	**7771**	**7856-8011**	**8496**	**8921**

As shown in Table 11, for Alt 2 (Min. Intervention) no hunting would be allowed plus a small general decrease in recreation visitor days is anticipated as compared to Alternative 1. For Alt 3 (Restrained Intervention), no hunting during drought years plus a small general decrease in recreation visitor days is anticipated as well. Annual recreation and hunter visitor days are expected to increase for Alt 4 (Proposed Alternative) due to increased opening of the Childs Mountain overlook after the Sonoran pronghorn population is stabilized and increased hunting opportunities for mule deer and predators. For alternative 5 (Maximum Intervention), recreation and hunter visitor days are expected to include the same increases as Alternative 4 plus have a slightly higher increase in recreation visits. This increase is due to expanded public use opportunities including use of dead or downed wood, use of off-highway vehicles on the public access road as well as improvements to the Copper Canyon Loop road.

Local and Statewide Impacts of Recreation Visitor Spending

The economic impacts of visitor spending will be estimated at the local (town of Ajo) and statewide level. To determine the local economic impacts of visitor spending in the Town of Ajo, only spending by persons living outside the local area is included in the analysis. The rational for excluding local visitor spending is two fold. First, money flowing into Ajo from visitors living outside is considered new money injected into the Ajo economy. Second, if local residents visit Cabeza Prieta NWR more or less due to the management changes, they will correspondingly change their spending of their

money elsewhere in the Ajo area, resulting in no net change to the local economy. These are standard assumptions made in most regional economic analyses at the local level. For the statewide economic impact analysis, visitors were split between Arizona residents and visitors that did not reside in the State of Arizona (hereafter referred to as nonresidents). The rationale is the same as the local analysis split. When estimating the spending by visitors within the State of Arizona, spending by Arizona residents is not considered as being new money injected into the state economy. It is likely Arizona residents will spend their money else where in the state even if they decide to visit the Refuge less often due to management changes.

Results from the visitor survey (Burkardt et al. 2003) indicate that 21% of annual recreation visitors are local residents, 34% are non local Arizona residents, and 45% are nonresidents. Because only spending by recreation visitors living outside the Ajo area is included in the local impact analysis, the number of visitor days for each alternative reported in Table 11 was adjusted accordingly. For Alternative 1, the annual average of 6,167 non local visitor days was used as the non local visitation estimate for the local economic impact model and 3,513 nonresident visitor days was used as the nonresident visitation estimate for the statewide economic impact model.

Table 12 illustrates the visitor survey results (Burkardt et al. 2003) for average amount spent locally in Ajo and Yuma by non-local visitors and total spent within the State of Arizona by non resident visitors. Amounts of local spending in Ajo and Yuma are the average expenditures non-local visitors (living outside of Ajo and Yuma) reported spending in the local communities near the Refuge. Because the Refuge has entrances near Ajo and Yuma, the survey asked visitors to specify which town local purchases were primarily made in. Results from the visitor survey (Burkardt et al. 2003) show that 84% of local purchases were made in Ajo, 16% were made in Yuma. The amounts of spending in the State of Arizona are the summed expenditures that non resident visitors reported spending in the local area near the Refuge and the amount spent in rest of Arizona en route to the Refuge.

Table 12. Average Visitor Spending

	Visitor Spending	
	$ per Group per Trip	$ Per Person per Day
Non-Local Spending in Ajo and Yuma		
Gasoline/related automobile costs	50.55	5.67
Hotels	24.69	2.77
Camping	29.12	3.27
Restaurants	39.68	4.45
Grocery Stores	52.61	5.90
Supplies & Souvenirs	15.05	1.69
Other Expenses	21.16	2.37
Total Spending	**232.86**	**26.11**
Nonresident Spending in Arizona		
Gasoline/related automobile costs	120.71	13.54
Hotels	55.64	6.24
Camping	84.60	9.49
Restaurants	78.72	8.83
Grocery Stores	116.95	13.11
Supplies & Souvenirs	43.01	4.82
Rental Car	41.30	4.63
Other Expenses	50.30	5.64
Total Spending	**591.23**	**66.30**

Not every group had expenditures in every category, so the numbers reported in Table 12 represent an average across all visitors, including some who had no expenditure in that category. It should be noted that all expenditure categories asked in the survey were included in the regional economic analysis, not just the major categories shown in the table below. The average expenditures reported in each category were divided by the average number of persons in each group sharing the expenses (3.38 persons) and then divided by the average number of days (2.64) spent in the local area to determine the average spending per person per day. Table 12 shows that on average, non local visitors spent the most on grocery stores, gasoline, and restaurants in the local area near the Refuge. Nonresident visitors spend the most on gasoline, grocery stores, camping, and restaurants while in the state of Arizona.

Local Economic Impacts

The current level of Refuge recreational visitor days accounts for $161,032 of spending annually by non-local visitors in the local communities near the Refuge (Ajo and Yuma). Because the local economic impact model only includes the town of Ajo and the survey results showed that 16% of the local spending occurred in Yuma, the economic impact analysis only accounted for 84% of the trip spending reported in Table 12 in order to accurately reflect the purchases made in the Ajo area. Therefore, the amount of visitor spending occurring in Ajo is approximately $135,267 per year.

Table 13 shows the economic impacts associated with the expected levels of Refuge visitation by alternative for the town of Ajo. The table shows the direct impact, the indirect impact (e.g., the multiplier effect), and the summed total impact of income and jobs. The current level (Alternative 1) of Refuge visitation accounts for $55,233 in personal income and 2.2 jobs which represents less than one quarter of one percent of total income and employment in the Ajo economy. Small decreases in associated visitor days for Alternatives 2 and 3 would decrease employment by 0.1 of a job and personal income by $250 as compared to Alternative 1. Increases in visitation for Atlernatives 4 (Proposed Alternative) and 5 would generate slightly more economic impacts than Alternative 1. However, because the economic impacts associated with current (Alternative 1) Refuge visitation represent such a small impact on the local economy, even a substantial change from the current visitation will only have minor economic impacts.

Table 13. Economic Impacts of Non Local Visitor Spending in the Town of Ajo.

Ajo Economy	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Direct Effects					
Income ($/year)	$38,547	$38,372	$38,372	$40,640	$42,741
Jobs	1.7	1.6	1.6	1.7	1.8
Indirect and Induced Effects					
Income ($/year)	$16,686	$16,611	$16,611	$17,593	$18,502
Jobs	0.5	0.5	0.5	0.5	0.6
Total Effects					
Income ($/year)	**$55,233**	**$54,983**	**$54,983**	**$58,233**	**$61,243**
Jobs	**2.2**	**2.1**	**2.1**	**2.2**	**2.4**
% Total Ajo Income	*0.07%*	*0.07%*	*0.07%*	*0.07%*	*0.08%*
% Total Ajo Employment	*0.15%*	*0.15%*	*0.15%*	*0.15%*	*0.17%*

Table 14 provides a breakdown of the impact current (Alternative 1) Refuge non local visitation has on local Ajo employment industry. While there are a total of 2.2 jobs in Ajo that are directly and indirectly attributed to Refuge visitation, as Table 14 shows there is not one full job in any industry that is directly attributed to Refuge visitation. The largest employment impacts by non local Refuge visitors are for almost three fourths of a job in the eating & drinking industry job and one half of a job in the hotel industry.

Table 14. Impact of Current Refuge Visitation on Ajo Employment by Industry.

Industry	Direct Impact	Indirect & Induced Impact	Total Impact
Wholesale Trade	0.1	0.1	0.2
Food Stores	0.1	0.1	0.2
Automotive Dealers & Service Stations	0.1	0.0	0.1
Eating & Drinking	0.6	0.1	0.7
Miscellaneous Retail	0.1	0.0	0.1
Banking	0.0	0.1	0.1
Hotels and Lodging Places	0.4	0.0	0.5
Federal Government - Non-Military	0.1	0.0	0.1
State & Local Government – Education	0.0	0.1	0.1
State & Local Government - Non-Education	0.0	0.1	0.1
Total Jobs	**1.5**	**0.6**	**2.2**

Statewide Economic Impacts

The current level of Refuge recreational visitor days accounts for $233,041 of regional spending annually by nonresident visitors in the State of Arizona. Regional spending includes all spending by nonresidents in the Ajo area and the amount spent in Arizona en route to the Ajo area but excludes spending by non local Arizona residents in the Ajo area. Table 15 shows the economic impacts associated with the expected levels of nonresident Refuge visitation by alternative for the state of Arizona. The table shows the direct impact, the indirect impact (e.g., the multiplier effect), and the summed total impact of income and jobs. Current Refuge nonresident visitation accounted for $140,764 in personal income and 5 jobs in the state of Arizona, representing well less than one percent of total local income and employment. Because the economic impacts associated with current Refuge visitation represent such a trivial impact on the regional economy, even a substantial change from the current visitation will not have significant impacts.

Table 15. Economic Impacts of Nonresident Visitor Spending in the State of Arizona.

State of Arizona	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Direct Effects					
Income ($/year)	$71,311	$70,986	$70,986	$75,188	$79,065
Jobs	2.9	2.9	2.9	3.1	3.2
Indirect and Induced Effects					
Income ($/year)	$69,453	$69,137	$69,137	$73,228	$77,005
Jobs	2.1	2.1	2.1	2.2	2.4
Total Effects					
Income ($/year)	**$140,764**	**$140,123**	**$140,123**	**$148,416**	**$156,070**
Jobs	**5.0**	**5.0**	**5.0**	**5.3**	**5.6**
% Total State Income	*0.0001%*	*0.0001%*	*0.0001%*	*0.0001%*	*0.0001%*
% Total State Employment	*0.0002%*	*0.0002%*	*0.0002%*	*0.0002%*	*0.0002%*

Spending by Refuge Hunters

The Refuge offers a very limited number of hunting permits for bighorn sheep. Nine respondents of the visitor survey (Burkardt et al. 2003) indicated that their visit to the Refuge was for hunting bighorn sheep. Table 16 illustrates the average amount spent locally in Ajo and Yuma by Refuge hunters. The average expenditures reported in each category were divided by the average number of persons in each group sharing the expenses (2.33 persons) and then divided by the average number of days (11 days) spent in the local area to determine the average spending per hunter per day. As for the town purchases are primarily made in, two of the nine hunters indicated Ajo was where they made purchases, two made purchases in Yuma, two made purchases in Tacna, and one primarily made purchases in Gila Bend. Because there are so few hunters (average 8 permits per year) and only two indicated spending money in Ajo, the total amount of spending by hunters in Ajo totals approximately $1,035 per year. This amount is too small to calculate the economic impacts with the IMPLAN model. Only one hunter was a nonresident, therefore the regional economic impacts are too small to calculate as well.

Table 16. Hunter Spending

	Hunter Spending	
	$ per Group per Trip	$ Per Person per Day
Non-Local Spending in Ajo and Yuma		
Gasoline/related automobile costs	210.56	8.22
Hotels	22.24	0.87
Camping	1.21	0.04
Restaurants	31.01	1.21
Grocery Stores	106.13	4.14
Supplies	0.00	0.00
Hunting License	30.56	1.19
Taxidermy	111.11	4.34
Game Processing	22.02	0.87
Other Expenses	278.78	2.37
Total Spending	**813.62**	**23.25**

Non Market Trip Values

The wildlife and natural environments of the Sonoran Dessert are of substantial value to visitors, hunters, and other individuals who value the idea that these resources are maintained in a viable state. Part of this value is reflected in the expenditures that Refuge visitors make for lodging, food, and other travel services. However, the main reason that visitors make the often long and expensive trip to this area is not primarily to eat in local restaurants or spend a night in a motel in Ajo. Visitors make these trips because the benefits of the trip exceed the dollar costs.

Benefit studies are concerned with the demand side of the tourism industry. Because visitors are charged only nominal or no fees for National Wildlife Refuge and National Park visits, trip values do not have market prices. The nonmarket value (values for items not exchanged in established markets) of visitor trips is measured by how much they would be willing to pay over and above the costs of the trip before they would choose to forego the trip (Loomis and Richardson, 2001). A recent summary of the economic values associated with wilderness areas by Loomis and Richardson (2001) determined the average net willingness to pay for visiting wilderness areas is $40 per visitor day. In 2001, wilderness area visits to Cabeza Prieta National Wildlife Refuge totaled 7,806 visitor days. Thus the additional nonmarket value of Refuge recreation wilderness visits totals over $312,000 annually.

Passive Use Values

The economic value of Cabeza Prieta National Wildlife Refuge resources is only partly measured by the demand for onsite use by visitors and hunters. Refuge lands preserve historic, cultural, and recreational resources for residents and visitors from around the world. The wilderness areas and habitat for the endangered Sonoran pronghorn provided by Cabeza Prieta National Wildlife Refuge are clearly a resource of national and even international significance. Many individuals value the idea that the wildlife and natural environments of the Sonoran Dessert are being maintained in a viable state independent of whether they will actually themselves be able to visit the area. The value

of knowing the resource exists and is protected (existence value), having the opportunity for visits in the future (option value), and the motivation to provide the resource for future generations (bequest value) are often referred to as passive use values (Krutilla 1967).

Contingent Valuation (CV) surveys are often used to simulate what people would pay when a market does not exist (e.g. wilderness protection or wildlife preservation). A summary of the recent research on passive use values associated with wilderness areas by Loomis and Richardson (2001) estimated the average annual passive use value associated with wilderness areas is $6.72 per acre of wilderness in the western United States. Cabeza Prieta National Wildlife Refuge comprises of approximately 803,413 acres of wilderness thereby yielding annual passive use values of over $5.3 million.

The Sonoran pronghorn, an endangered species with international significance, ranges across the Sonoran desert in small, scattered bands. The Refuge has the lead role in Sonoran pronghorn recovery. While several CV studies have been conducted to measure the values associated with threatened and endangered species, no specific studies or welfare estimates exist for the Sonoran Pronghorn. Therefore, the passive use benefits associated with the Sonoran Pronghorn habitat protection on Refuge can not be measured. However, King et al. (1988) estimated an annual willingness to pay of $12.36 for big horn sheep preservation by Arizona households. Given the international significance associated with the Sonoran Pronghorn, the associated passive use values would meet or exceed those associated with bighorn sheep preservation.

Summary and Conclusions

Table 17 summarizes the direct and total economic impacts for all Refuge management activities by management alternative. Under current Refuge management (Alternative A), economic activity directly related to all Refuge operations generate an estimated 14.7 jobs and $614,276 in the Town of Ajo. Including direct, indirect, and induced effects, all Refuge activities would account for 19.1 jobs and $738,737 in personal income in Ajo. Current Refuge management activities account for 1.34% of total employment and 0.95% of total income in Ajo. Because of increases in staffing, Alternatives 2, 3, 4, and 5 would generate more jobs and income than Alternative 1. However, even though more jobs and income are generated, the overall impact on the Ajo economy is not significant.

Table 17. Economic Effects of Refuge Activities by Sector in the Ajo Economy.

Sector and Type of Effect	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Refuge Management					
Direct Effects					
Personal Income ($/year)	$575,729	$594,425	$657,314	$693,338	$777,952
Employment (jobs)	13.0	13.5	14.9	15.8	18.0
Total Effects					
Personal Income ($/year)	$683,504	$704,855	$780,120	$823,466	$927,905
Employment (jobs)	16.9	17.4	19.3	20.5	23.3
Recreation					
Direct Effects					
Personal Income ($/year)	$38,547	$38,372	$38,372	$40,640	$42,741
Employment (jobs)	1.7	1.6	1.6	1.7	1.8
Total Effects					
Personal Income ($/year)	$55,233	$54,983	$54,983	$58,233	$61,243
Employment (jobs)	2.2	2.1	2.1	2.2	2.4
Aggregate Effects					
Direct Effects					
Personal Income ($/year)	$614,276	$632,797	$695,686	$733,978	$820,693
Employment (jobs)	14.7	15.1	16.5	17.5	19.8
Total Effects					
Personal Income ($/year)	$738,737	$759,838	$835,103	$881,699	$989,148
Employment (jobs)	19.1	19.5	21.4	22.7	25.7
% of Total Ajo Income	*0.95%*	*0.98%*	*1.07%*	*1.13%*	*1.27%*
% of Total Ajo Employment	*1.34%*	*1.37%*	*1.51%*	*1.60%*	*1.81%*

Table 18 summarizes the economic effects associated with management changes from Alternative A. All proposed alternatives will increase employment and personal income in the Town of Ajo primarily because of the proposed increases in staffing.

Table 18. Economic Effects Associated with Changing from Alternative 1.

Sector and Type of Effect	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Refuge Management				
Direct Effects				
Personal Income ($/year)	+$18,696	+$81,585	+$117,609	+$202,223
Employment (jobs)	+0.5	+1.9	+2.8	+5.0
Total Effects				
Personal Income ($/year)	+$21,351	+$96,616	+$139,962	+$244,401
Employment (jobs)	+0.5	+2.4	+3.6	+6.4
Recreation				
Direct Effects				
Personal Income ($/year)	-$175	-$175	+$2,093	+$4,194
Employment (jobs)	-0.1	-0.1	0	+0.1
Total Effects				
Personal Income ($/year)	-$250	-$250	+$3,000	+$6,010
Employment (jobs)	-0.1	-0.1	+0	+0.2
Aggregate Effects				
Direct Effects				
Personal Income ($/year)	+$18,521	+$81,410	+$119,702	+$206,417
Employment (jobs)	+0.4	+1.8	+2.8	+5.1
Total Effects				
Personal Income ($/year)	+$21,101	+$96,366	+$142,962	+$250,411
Employment (jobs)	+0.4	+2.3	+3.6	+6.6

Although the economic impacts associated with current Refuge visitation are somewhat limited in terms of overall tourism activities in the area, Cabeza Prieta NWR plays an important part in the overall recreational opportunities and scenic open space that makes the Sonoran Desert a popular tourist destination. Any decrease in visitation associated with a change in Refuge management will not have a significant economic effect. An increase in the amount of time current visitors spend on the Refuge will increase the amount of daily spending that can be attributed to visiting the Refuge. An increase in both the length of stay on the Refuge (and in the Ajo economy) and the number of people visiting the Refuge could have a considerable impact on increasing the role Refuge visitors play in the Ajo economy.

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Appendix M: Comprehensive Conservation Plan Management Goals, Objectives and Strategies

GOAL 1: WILDLIFE AND HABITAT MANAGEMENT

Protect, maintain, enhance and/or restore the diversity and abundance of wildlife species and ecological communities of the Sonoran Desert represented at Cabeza Prieta National Wildlife Refuge (NWR).

Objective 1:

Continue to gather sound scientific data on the size and movements of the U. S. sub-population of Sonoran pronghorn.

Current Status:

The refuge coordinates population survey/monitoring activities with the Arizona Game and Fish Department (AGFD). Regularly occurring activities include an aerial survey of all Sonoran pronghorn habitat on the refuge every two years using a standard protocol that provides population estimates with a 95 percent confidence interval, less rigorous surveys on alternating years, and weekly aerial reconnaissance of portions of the refuge Sonoran pronghorn habitat. Two Sonoran pronghorn are currently radio collared.

Rationale for Objective:

This objective, is an action item of the Sonoran pronghorn recovery plan.

Strategies for Accomplishing Objective:

1. In cooperation with the Arizona Game and Fish Department (AGFD), conduct the survey of the U.S. sub-population at least biennially.
2. When necessary weather conditions are present, and a determination has been made that the risk of capture myopathy is sufficiently low, the refuge will conduct radio collaring operations, with eventual goal of having operating radio collars on 10 percent of the U.S. population.
3. The refuge, in cooperation with AGFD, will continue weekly aerial monitoring of radio collared pronghorn.
4. Refuge and AGFD staff will monitor fawn recruitment while conducting the weekly telemetry flights.

Objective 2:

Continue to ensure that reliable sources of free water are available in at least 22 locations within the range of the Sonoran pronghorn.

Current Status:

Twenty-two developed waters located within Sonoran pronghorn habitat are currently functional. Two of these waters, Charlie Bell and Bassarisc Tank, are used by both desert bighorn sheep and Sonoran pronghorn. The remaining 20 functional pronghorn waters include: Redtail and Jose Juan Charcos, excavations in the soil which collect runoff and are supplemented by fiberglass tanks and drinking troughs; Adobe Well, Adobe House Well and Tanks, Chico Shunie Well, Jack's Well, Little Tule Well, Lower Well, Papago Well, Tiller Well, Antelope Tank, and nine recently developed buried storage tanks with multiple water collection locations and regulated wildlife drinking troughs

Supplemental water is periodically hauled to six of the pronghorn waters, Redtail Charco, Jose Juan Charco, Antelope Tank, Bassarisc Tank, Jack's Well, and Little Tule Well. Antelope Tank has been redeveloped using a model that has been successful in other southwestern desert environments. This includes a large buried storage tank, multiple runoff collection points and a drinking trough metered by a float valve. In more than two and one-half years of operation, including a period of prolonged drought in the fall and winter of 2005 and 2006, Antelope Tank has not required any supplemental water. This suggests that supplemental water will be required very infrequently, and only after protracted drought. The nine recently developed buried tanks also employ this model, and should require only very infrequent hauling of supplemental water. Little Tule Well is proposed for redevelopment, and likely will not require water hauling after redevelopment. The remaining wells pump water through the use of windmills and do not typically require any hauling of supplemental water.

Rationale for Objective:

While there is some debate among wildlife biologists regarding the efficacy of developed water to support populations in arid regions, it is professional judgment of refuge biologists and the Sonoran pronghorn recovery team that the developed waters should be maintained and supplied with water. Experiments with temporary waters conducted in the summers of 2002 and 2003 demonstrated that Sonoran pronghorn do use new sources of free water in the refuge environment. The refuge will continue to study the effects of supplying supplemental water and will provide water to pronghorns as long as the recovery plan and recovery team mandate.

Strategies for Accomplishing Objective:

1. Continue hauling water as needed to Redtail Charco, Jose Juan Charco, Antelope Tank, Bassarisc Tank, the nine newly developed Sonoran pronghorn waters, Jack's Well, Adobe Well, and Little Tule Well.
2. Redevelop non-functioning or poorly functioning pronghorn waters at Jack's Well and Chico Shunie Well.
3. Survey Sonoran pronghorn habitat throughout the refuge to identify potential sites for upgraded developed waters similar to the redeveloped water at Antelope Tank.
4. Develop additional waters at suitable sites in Sonoran pronghorn habitat, should the Sonoran pronghorn recovery team determine they are necessary.
5. If suitable, reliable equipment can be located, install water sensors with remote transmission capability in Sonoran pronghorn waters.
6. Annually collect samples of water from all developed waters in Sonoran pronghorn habitat and sample for organisms or compounds pathogenic to Sonoran pronghorn.

Objective 3:

Continue to review and evaluate Sonoran pronghorn use of developed waters, both temporary and permanent.

Current Status:

During the summers of 2002 and 2003 the refuge placed temporary waters south of Charlie Bell Road in Daniels Arroyo, and at two locations on the bajada of the Agua Dulce Mountains. Water were equipped with automated cameras set to photograph any large animal that approached the water. Refuge and AGFD staff visited the temporary waters regularly to replenish the water supply, recover film and service the cameras. Monitoring demonstrated that pronghorn did find and use the temporary waters. Analysis of this study and review of secondary source materials confirms that Sonoran pronghorn will readily use supplemental water, but its role in Sonoran pronghorn recovery is still not fully understood (Morgart et al. 2005).

Rationale for Objective:

Evaluating pronghorn use of sources of free water is an objective of the Sonoran pronghorn recovery plan. Additional information about the pronghorn's use of developed waters will be useful in developing recovery actions to be implemented on the refuge.

Strategies for Accomplishing Objective:

1. Determine occupied habitat in early summer, examine locations of known waters, select areas of occupied habitat without water nearby, and pack in portable waters. Monitor use with cameras.
2. Monitor developed waters in Sonoran pronghorn habitat using automated cameras, on a sample of the waters to document use by pronghorn, other wildlife and undocumented aliens (UDAs).

Objective 4

Continue to operate semi-captive breeding enclosure for Sonoran pronghorn and relocate breeding stock from Mexico to the enclosure.

Current Status:

In 2003 refuge staff established a semi-captive breeding site for Sonoran pronghorn, following guidelines from a white paper on Sonoran pronghorn reestablishment standards prepared for the Canada/Mexico/U.S. Trilateral Committee for Wildlife and Ecosystem Conservation and Management (Morgart et al., 2002) The breeding enclosure is located in refuge non-wilderness south of Charlie Bell Road. This is an area of approximately 260 hectares (640 acres) enclosed by a fence that will contain pronghorn and exclude predators. Predators, primarily coyote, were aggressively trapped and removed from the enclosure. A water source, Tiller Well, has been drilled in the enclosure to provide both a source of free water in a wildlife drinking trough and irrigation water for a forage plot. This plot is irrigated to mimic rainfall received in a wetter than average year, but is not planted with forage species. Rather, the existing seed bank in the soil supplies the source of vegetation, decreasing the likelihood of introducing non-native plant species. After observing Sonoran pronghorn eating alfalfa hay used as bedding material during transport, refuge staff has provided alfalfa hay in a manger as a supplemental food source in periods of drought. During 2004 and 2005 refuge and AGFD staff captured Sonoran pronghorn in Mexico and on the refuge to serve as breeding stock. In the spring of 2006 there were 18 adult Sonoran pronghorn in the facility, 12 does, 2 breeding bucks and 4 yearling bucks. The yearling bucks were considered surplus animals and they were scheduled for release into the refuge when conditions were favorable.

Rationale for Objective:

Establishing relocation methodology and protocols is an action item in the Sonoran pronghorn recovery program. By providing enhanced food and water resources in an environment of reduced predation, the semi-captive breeding enclosure should foster high recruitment rates. Crossing females from Mexico's larger population with refuge male stock should help increase the overall genetic diversity of the small U.S. population of Sonoran pronghorn.

Strategies for Accomplishing Objective:

1. Monitor the enclosure regularly to detect predator entry, pronghorn productivity and general health.
2. Consider experimental planting of alfalfa in the enclosure's forage enhancement area.

Objective 5

Continue to close eastern portion of refuge to visitor access during Sonoran pronghorn fawning season.

Current Status:

From 2002 to 2006 the refuge has been closed to all public access in an area ranging from its eastern boundary to a north-south line passing approximately 8 kilometers (5 miles) east of Tule Well, or approximately the eastern three-quarters of the refuge, between March 15 and July 15. This closure is aimed at protecting Sonoran pronghorn from disturbance during their fawning season, when fawns and nursing mothers are particularly sensitive.

Rationale for Objective:

"Reducing disturbance at critical times of the year" is called for in the Sonoran pronghorn recovery plan. Other public lands near the refuge have been ordered to close public access during the Sonoran pronghorn fawning season as a condition of their biological opinions under Section 7 of the Endangered Species Act. Such closure should benefit the species during a period of time critical to recruitment of new animals.

Strategy for Accomplishing Objective:

1. Closure of eastern portion of refuge during Sonoran Pronghorn fawning season until the U.S. population has stabilized is recommended in the CCP Biological Assessment.

Objective 6:

Within two years of plan adoption, develop two additional forage enhancement areas in Sonoran pronghorn habitat on the refuge.

Current Status:

The semi-captive breeding enclosure, described above under Objective 4, includes one forage enhancement area for Sonoran pronghorn. Three other forage enhancements have been developed in the Childs Valley of the refuge and two to the north of the refuge on the Barry M. Goldwater Range (BMGR).

Rationale for Objective:

Establishing and evaluating forage enhancement plots on BMGR is the first recovery objective mentioned in the Sonoran pronghorn recovery plan. Sonoran pronghorn have been observed using existing enhancements on the refuge and BMGR. The Sonoran pronghorn recovery team endorses developing two additional plots on the refuge.

Strategies for Accomplishing Objective:

1. Survey refuge for suitable forage enhancement sites.
2. Select sites of approximately 10 hectares (25 acres), in areas of higher than average vegetative cover and documented frequent pronghorn presence.
3. Selectively thin creosote bush by burning with a hand-held propane-fired weed burner to create openings.
4. Rig approximately 2.4 hectares (6 acres) within each forage enhancement area for sprinkler irrigation and irrigate to mimic natural rainfall of a slightly wetter than average year.
5. Monitor use of the forage enhancement with automated cameras.

Objective 7:

Within two years of plan adoption, implement a study of Sonoran pronghorn predator density, movement, and developed water use on the refuge. Under certain situations, implement predator controls.

Current Status:

Studies of predation on Sonoran pronghorn on the refuge to date have been limited to necropsy of pronghorn mortalities to identify cause of death and incidental observation of coyote and other predators during weekly pronghorn reconnaissance flights.

Rationale for Objective:

The Sonoran pronghorn recovery plan calls for "reducing predation through the selective removal of coyotes from specific areas and at times of the year when adult female pronghorn are most susceptible to predations (the need for coyote control will vary from year-to-year based on environmental conditions)." Conducting predator studies will enhance the refuge's ability to determine the likely impact of predation and better focus/time coyote removal.

Strategies for Accomplishing Objective:

1. Radio collar at least three coyotes to facilitate tracking.
2. Investigate use of developed waters, size of home range and breeding success of coyote on the refuge.
3. When the U.S. Sonoran pronghorn population is below 100 and winter and spring precipitation is 50 percent or less of the average, selectively remove coyotes from pronghorn fawning and rearing habitat.

Objective 8:

Within one year of plan adoption install additional measures to protect the lesser long-nosed bat maternity roost on refuge.

Current Status:

Although the location of the maternity roost is remote and unpublished, it had been used frequently as a shelter by UDAs or smugglers. This use may have been responsible for the roost's not having been used by lesser long-nosed bats during the summer of 2003. In the early spring of 2004, the refuge installed a steel fence ranging from 2.5 to 3 meters (8 to 10 feet) high around the roost entrance to discourage human entry. The fence is constructed of 2.5-centimeter (1-inch) vertical pipes welded to cross pipes at 13-centimeter (5 - inch) intervals. The tops of the vertical pipes are cut at an angle to produce a sharp point and the top 30 centimeters (12 inches) of the pipe is bent outwards. The sharp tops and outward bend should make climbing over the fence difficult. This fence provided an immediate positive effect to bats that were displaced by human interference. Bats returned to roost in large numbers during the summers of 2004 and 2005. Refuge staff periodically monitors the entrance to the roost to document damage caused by unauthorized human use and assess use by bats. Refuge law enforcement personnel conduct periodic surveillance of the roost to check signs that the entrance has been used as a campsite, storage area or shelter and/or apprehend persons so using the entrance. Refuge biologists will continue to survey for additional, unknown roost sites on the refuge. The refuge will continue to keep the location of the roost unpublished. Survey and surveillance activities are conducted on foot in wilderness.

Rationale for Objective:

Recovery actions for this endangered bat species include protection of all known roost sites from disturbance. Eliminating or reducing the roost disturbance known to occur on the refuge is thus a priority.

Strategies for Accomplishing Objective:

1. Install a gate at the roost entrance if there is any evidence that unauthorized human use of the roost entrance is occurring. This gate will be locked closed during the season when the migratory bats are not present, to interrupt patterns of human use. The gate will be locked open during the bat's breeding and rearing season, as juvenile lesser long-nosed bats are poor flyers and have little ability to pass through any type of gate. The gate will be designed to allow passage of adult bats in case it remains closed inadvertently. This gate will be a secondary line of defense, should unauthorized users breach the fence.
2. Post bi-lingual signs warning of bio-hazards such as rabies to further discourage use of the roost entrance.
3. Continue to conduct periodic monitoring and surveillance of the roost entrance.

Objective 9:

Within three years of plan implementation, develop a refuge program to survey the refuge for endangered, threatened or recently delisted species believed to potentially occur on the refuge.

Current Status:

There are two credible records of Cactus ferruginous pygmy owl, recently delisted from endangered species status, occurring on the refuge. The Pierson's milkvetch, a threatened plant, has not been documented on the refuge, but occurs to the west of the refuge on U.S. Marine Corps lands. Suitable habitat for this plant occurs on the Pinta Sands in the south central portion of the refuge.

Rationale for Objective:

The refuge should develop accurate records of all federally protected species occurring within its boundaries.

Strategies for Accomplishing Objective:

1. Develop and implement a monitoring protocol for periodic cactus ferruginous pygmy owl surveys.
2. Develop and implement a survey protocol for Pierson's milkvetch.

Objective 10:

Continue to maintain a database of scientifically valid information regarding the size and composition of the refuge desert bighorn sheep population.

Current Status:

Refuge staff, in cooperation with AGFD, conducts aerial surveys of the refuge desert bighorn sheep population every 3 years (results of surveys conducted since 1993 are presented in Section 2.1.2 of the EIS). Approximately 10 percent of the known refuge desert bighorn sheep population is radio collared at any time. Refuge staff keeps records of sheep movement and maintains a database of desert bighorn sheep population statistics, including group size observed, sex and age structure, and percent of habitat surveyed.

Rationale for Objective:

Conservation of desert bighorn sheep was central to the creation of the refuge. Accurate information about the refuge's desert bighorn sheep population is essential to gauging the efficacy of conservation efforts of the refuge and identifying any needed changes in management regime.

Strategies for Accomplishing Objective:

1. Continue to participate cooperatively with AGFD in aerial surveys of refuge desert bighorn sheep every 3 years.
2. Keep active radio collars on 10 percent of the refuge desert bighorn sheep population.

Objective 11:

Within ten years of plan adoption, maintain a refuge desert bighorn sheep population of 500 to 700 sheep.

Current Status:

No desert bighorn sheep population target range is currently established. The refuge rather manages for a healthy, sustainable population of sheep. The most recent refuge population estimate for desert bighorn sheep is 348, with a 95 percent confidence interval of 236 to 658. This estimate was calculated from the results of the December 2005 population survey.

Rationale for Objective:

The proposed population range of 500 to 700 individual sheep on the refuge is the result of an effort to determine a sustainable population that the refuge might support in the absence of human-created decimating factors such as vegetation change from over-grazing, isolation of the refuge from perennial sources of water in the Gila River to the north, and introduction of disease by domestic livestock. The range was derived by comparing the densities of sheep per acre in other ranges in Southwestern Arizona and applying a low average to the acres of desert bighorn sheep habitat on the refuge.

Strategy for Accomplishing Objective:

1. If the desert bighorn sheep population does not reach the target range with 10 years of plan adoption, the refuge will revisit the target to evaluate its validity and evaluate management.

Objective 12:

Within three years of plan adoption, complete analysis of data generated from University of Arizona study of desert bighorn sheep use of developed waters. Continue to welcome proposals for research of the effect of developed waters on desert bighorn sheep populations.

Current Status:

The University of Arizona initiated an experimental study of desert bighorn sheep use of developed waters and movement response to changes in maintenance of developed waters on the refuge in 2002. Sheep were fitted with satellite radio collars that allow detailed tracking of movement. After two summers of tracking movement of collared sheep, developed waters in the Sierra Pinta Mountains (Heart, Eagle and North Pinta Tanks, see Figure K-1) were experimentally fenced off to exclude sheep access. The movement of sheep was then tracked for three years to detect the impact of removing access to developed waters. The initial experimental design called for longer tracking, but funds to continue the experiment was unavailable.

Rationale for Objective:

There is considerable controversy regarding the nature of the relationship between desert bighorn sheep and developed waters. This experiment was designed to explore that relationship and track behavioral and population level changes when access to developed waters is removed. As the results of this experiment are unlikely to be definitive, additional research is desirable.

Strategy for Accomplishing Objective:

1. The protocols for this experiment have been established by the University of Arizona.
2. The refuge will evaluate the data generated by University of Arizona.
3. The refuge will consider any proposals for additional research on desert bighorn sheep water use.

Objective 13:

If definitive research or experimental results are developed, consider developing additional waters or cessation of water hauling to existing waters.

Current Status:

As stated above there is considerable controversy regarding the effect of developed waters on desert bighorn sheep populations.

Rationale for Objective:

Desert bighorn sheep conservation is a refuge purpose, as is wilderness stewardship. Should better data be developed regarding the effects of developed water on sheep, the refuge should consider such data and act upon them in order to better pursue its purposes.

Strategies for Accomplishing Objective:

1. Should data demonstrate that additional developed waters would benefit sheep populations, the refuge would develop additional waters.
2. Prior to development of any water, the refuge would conduct a habitat analysis of the proposed site of the developed water.
3. After construction any new developed water, the refuge would monitor sheep response.
4. Should data demonstrate that developed water to not aid desert bighorn sheep conservation, the refuge would initiate a phased program of cessation of water hauling..
5. The refuge would monitor sheep response to cessation of water hauling.

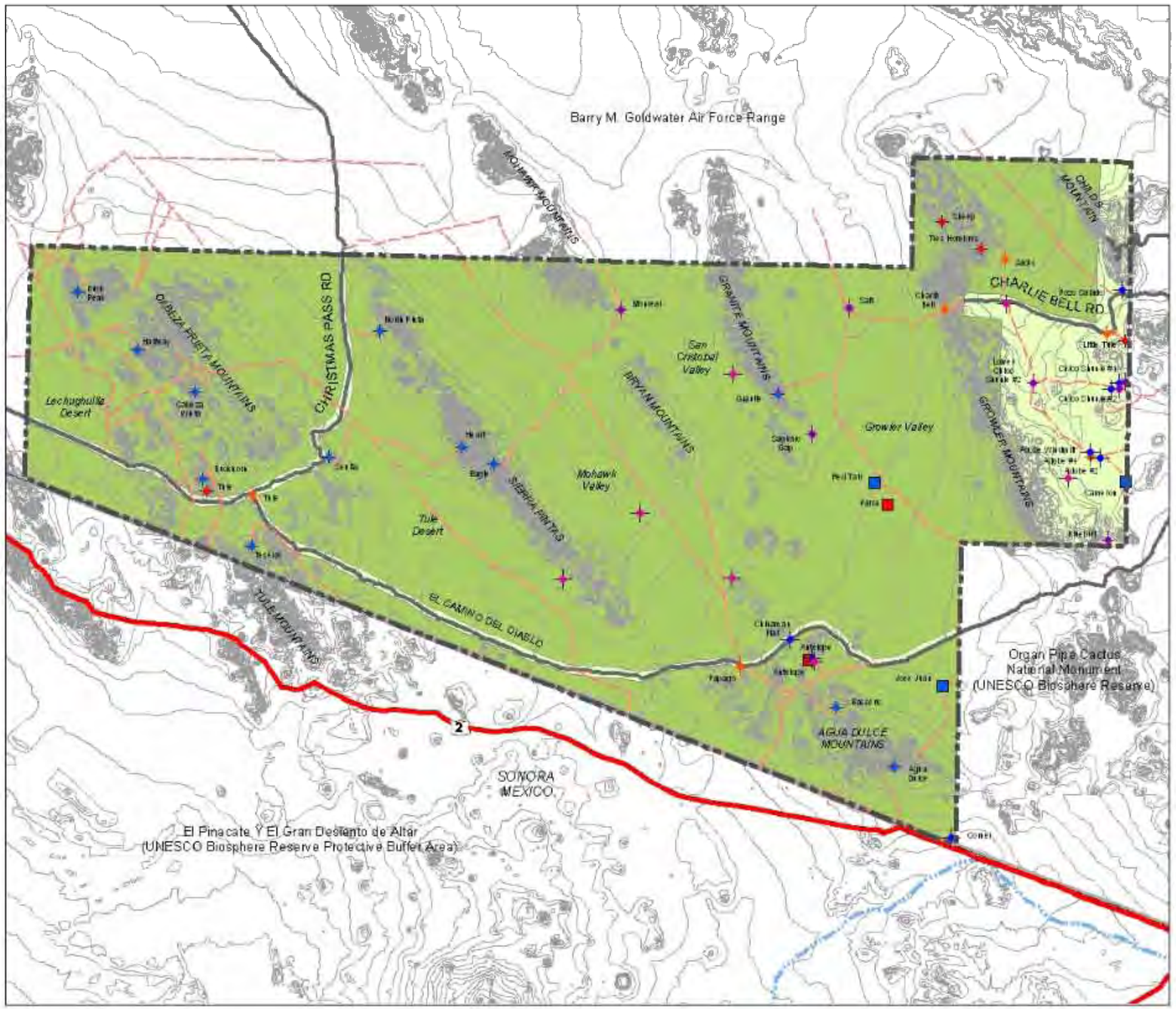


Figure K.1 Refuge Developed Waters

Legend

- Cabeza Prieta N.W.R.
- Wilderness
- Non-Wilderness
- Public Roads
- Administrative Trails
- US/Mexico Border
- Highway
- Rio Sonoyta
- Active Well
- Active Tinaja / Tank
- Inactive Tinaja / Tank
- Inactive Well
- Capped Well
- Active Charco
- Inactive Charco
- Waters for Sonoran Pronghorns

Sources: USFWS, 2003

0 1.5 3 6 9 12 Miles

N

CABEZA PRIETA
NATIONAL WILDLIFE REFUGE
COMPREHENSIVE CONSERVATION PLAN
UNITED STATES DEPARTMENT OF THE INTERIOR
FISH & WILDLIFE SERVICE

Objective 14:

Within 12 years of plan implementation, complete upgrades to the eight desert bighorn sheep developed waters located in wilderness.

Current Status:

The refuge maintains, and periodically supplies water to, eight developed waters located within desert bighorn sheep habitat in wilderness and one developed water located within desert bighorn sheep habitat outside of wilderness. The wilderness waters are Buck Peak, Halfway, Tuseral, Bassarisc, North Pinta, Granite, Eagle and Heart Tanks. The non-wilderness water is the Childs Mountain parabolic tank. The developed waters include short adits bored into bedrock to collect and hold water, as well as natural tinajas with developed enhancements such as sediment dams up gradient or small cement dams at the tinaja to increase its water capacity. Only the Childs Mountain parabolic tank is fully artificial; the other waters all use existing topography to collect water and variously developed depressions to catch and retain the water.

The refuge's approach to managing desert bighorn sheep requires assuring that these waters do not go dry during the hottest periods of the year. During a typical year a developed water may require no supplemental water or one to two loads of supplemental water, with the possibility for additional water hauling in periods of drought. Refuge staff typically hauls water in a 5,675 liter (1,500 gallon) capacity heavy truck. During the extreme drought of 2002, the refuge used a helicopter to deliver water to Heart Tank, although that is not normal practice.

Rationale for Objective

The refuge has provided supplemental wildlife waters in desert bighorn sheep habitat since the 1960s. There is dispute in professional wildlife circles regarding the efficacy of providing developed waters for desert bighorn sheep, and an experiment examining the dependence of sheep on developed waters at Cabeza Prieta is currently underway (see Objective 11). It is the professional opinion of refuge and other Service biologists, however, that provision of reliable sources of free water in desert bighorn sheep habitat has benefited, and will continue to benefit, sheep populations at Cabeza Prieta.
Some individuals and organizations have objected to the refuge's use of vehicles in wilderness to haul supplemental water. From both wilderness stewardship and operational efficiency points of view, reducing the frequency of water hauling trips or eliminating them entirely is desirable. The proposed upgrades to existing desert bighorn sheep waters are of a design that has been used successfully in similar habitats in Southern California and Southwestern Arizona (J. Hervert, AGFD, pers. comm. 2002), as well as at the Antelope Tank on the refuge, a developed water for Sonoran pronghorn. The improved design includes buried water storage tanks, multiple collection points in natural drainage ways and a drinking trough of limited surface area. These improvements greatly increase water collection efficiency during rainstorms, and reduce evaporation of stored water. Increases in water storage volume and collection efficiency, coupled with a decrease in evaporation, should greatly reduce the need to haul supplemental water. Additional benefits anticipated from the upgraded developed water are reduced visual profile as compared to the current waters and an enhanced feasibility of delivering supplemental water by helicopter should that option be desired.

Strategies for Accomplishing Objective:

1. Survey the terrain around the existing desert bighorn sheep developed waters in wilderness to identify suitable locations for water collection points and buried storage tanks. Consult with Regional Office engineering staff and others with experience in siting and designing wildlife waters.
2. Design upgraded waters with enhanced visual clues to water storage level so that water level can be easily checked during wildlife reconnaissance flights.
3. Design upgraded waters to facilitate adding supplemental water by helicopter drop.

4. Coordinate with non-governmental organizations, including, but not limited to, the Arizona Desert Bighorn Sheep Society and the Yuma Valley Rod and Gun Club, for volunteer labor to construct improved waters.
5. After installation is complete, monitor wildlife use through automated cameras.

Objective 15:

Within two years of plan adoption, implement studies, including radio collaring, to investigate use of developed waters, size of home range, breeding success, and movement of mountain lion on the refuge, as well as movement of mountain lion relative to movement of desert bighorn sheep.

Current Status:

Current knowledge regarding predation on refuge desert bighorn sheep by mountain lion is limited to some observed mortality of sheep from lion predation and incidental observation of lion during aerial reconnaissance.

Rationale for Objective:

Conservation of desert bighorn sheep was central to the creation of Cabeza Prieta NWR. Collecting data on lion predation will enhance the refuge management's understanding of ecological forces affecting the sheep populations.

Strategies for Accomplishing Objective:

1. Conduct radio collaring of mountain lion on the refuge and monitor movements.
2. Continue to investigate mortalities of collared desert bighorn sheep.

Objective 16:

Within three years of plan adoption, determine and track the status and distribution of bird species of conservation interest for the Sonoran Desert.

Current Status:

The refuge staff monitors Le Conte's thrasher nests for reproductive success, renesting attempts and nest site characteristics. Le Conte's thrasher is listed by the Arizona Partners in Flight program as an indicator of Sonoran Desert health.

Rationale for Objective:

The Service's Office of Migratory Bird Management lists several birds known or believed to inhabit the refuge as Birds of Conservation Concern. Similarly some birds that occur on the refuge have been listed by the Arizona Partners in Flight Program's indicators of Sonoran Desert health. Tracking the population trends, distribution, and habitat use of such birds on the refuge will contribute to overall knowledge of the health of the Sonora Desert ecosystem and also provide a measure of the effectiveness of habitat management of the refuge.

While refuge habitats are protected from urbanization, they are still impacted by illegal entries by undocumented aliens seeking access to the U.S., illegal transport of drugs through the refuge, actions of the agencies charged with protecting our borders from aliens and drugs, military operations (over flights currently, bombing missions in the past), refuge staff conducting various management actions and members of the public visiting the refuge. Also, areas outside of the refuge are impacted by development and other

land uses. Monitoring these populations will facilitate identification of long-term changes in Sonoran Desert health. The data collected can also be used to assess needs for landscape level conservation.

Strategies for Accomplishing Objective:

1. Initiate point counts for loggerhead shrike, Bell's vireo, gray vireo, crissal thrasher, yellow warbler, black-chinned sparrow and sage sparrow.
2. Continue to monitor Le Conte's thrasher nests for reproductive success, renesting attempts and nest site characteristics.
3. Initiate studies of the age/size class of saguaros used by nesting by Gila woodpecker and glided flicker.
4. Initiate collection of natural history information on the cactus ferruginous pygmy owl.
5. Record all data from these investigations/surveys in a database.
6. Repeat all surveys every two years.

Objective 17:

Within 5 years of plan adoption, implement surveys for desert tortoise, Gila monster, chuckwalla, canyon spotted whiptail and rosy boa.

Current Status:

While there have been isolated records of several of these animals on the refuge, no information regarding their numbers or distribution currently exists.

Rationale for Objective:

The refuge has not collected data on reptiles in a systematic manner. The Sonoran population of desert tortoise, a former candidate for listing as an endangered species, has received considerable attention due to the listing of the Mohave Desert tortoise population. The Service decided not to list this species because much of its habitat is on federal lands, but is still concerned about the species, and its populations should be monitored. The other reptiles listed above are indicators of the overall health of the Sonoran desert.

Strategies for Accomplishing Objective:

1. Use information from the Bureau of Land Management's (BLM) document "Desert Tortoise Habitat Management on Public Lands," to identify suitable habitat for the tortoise on the refuge. Conduct surveys in these areas, using protocols from the BLM.
2. Determine potential habitat for the Gila monster, chuckwalla, canyon spotted whiptail and rosy boa, and conduct survey of this habitat.

Objective 18:

Within five years of plan adoption, develop and implement protocols for inventory and monitoring of golden eagle, prairie falcon and raven.

Current Status:

The refuge does not currently monitor for raptors or ravens.

Rationale for Objective:

Collection of data on these high-level predatory birds will aid in identifying population trends among their prey species.

Strategy for Accomplishing Objective:

1. Refuge staff will review the protocols in place at other refuges and federally managed land and prepare similar protocols for the refuge.

Objective 19:

Within five years of plan adoption, develop and implement a program to monitor long-term desert health on the refuge.

Current Status:

The refuge formerly operated eight meteorological instruments that record precipitation, temperature and humidity, these instruments are currently non-functional and need repairs. The refuge established vegetation transects in 2002 for repeat monitoring to detect changes in vegetation composition over time.

Rationale for Objective:

Given concerns about climate change, human impacts and the effects of invasive/exotic species, monitoring the long-term condition of the desert is appropriate.

Strategies for Accomplishing Objective:

1. Repair and relocate meteorological instruments.
2. Resume monitoring of meteorological instruments.
3. Continue to periodically survey vegetation transects.
4. With the Regional Office Remote Sensing Scientist, develop and implement a change detection analysis using aerial photography sampling.

Objective 20:

Within three years of plan adoption, the refuge will develop protocols to survey invasive/exotic species, establish priorities for invasive species management, and develop measures to limit the spread of invasive species

Current Status:

Three invasive plant species: buffelgrass, Sahara mustard, and fountain grass have become established on the refuge. Domestic and feral animals continue to be an occasional problem on the refuge.

Rationale for Objective:

Invasive, exotic plant species can disrupt native ecosystems through aggressive displacement of native species. Many domestic or feral animals can carry diseases pathogenic to native wildlife, particularly desert bighorn sheep.

Strategies of Accomplishing Objective:

1. Continue to train refuge staff to recognize nonnative vegetation encountered during refuge field-work and document its location and extent of spread.
2. The refuge will work with the Mexican government to identify means of controlling the spread of exotic plants along Mexican Highway 2.
3. Where new or isolated small infestations of invasive plants are located, refuge staff will eradicate them using hand pulling or appropriate chemical means to prevent the spread of infestations.
4. When trespass livestock is encountered, refuge staff will attempt to locate the owner and have the livestock removed quickly. When no owner can be found, trespass livestock will be humanely removed.

Objective 21:

Within five years, develop and implement a protocol for surveying the refuge mule deer population.

Current Status:

There is no systematic survey of refuge mule deer populations. Information about the populations is anecdotal.

Rationale for Objective:

The refuge mule deer population likely completes directly with the endangered Sonoran pronghorn population for forage and water resources. An increased understanding of the status of mule deer population on the refuge will facilitate informed decisions regarding management of this resource.

Strategies for Accomplishing Objective:

1. Consult with AGFD to identify practical methods of deer survey.
2. Implement surveys as staffing land budget allow.

GOAL 2: WILDERNESS STEWARDSHIP

Protect and conserve refuge wilderness employing strategies of wildlife and plant conservation that will maintain and restore the wilderness character of Cabeza Prieta NWR.

Objective 1:

Throughout life of plan, conduct minimum requirements analysis (MRA) prior to initiating any management actions taking place in wilderness.

Current Status:

Activities generally prohibited in wilderness may be approved under Section 4(c) of the Wilderness Act of 1964, when they are the minimum required to meet the needs of administering the wilderness. The MRA is a two-step process of determining, first that the proposed activity is necessary to administer the land as wilderness, and second that the activity is the minimum (or least disturbing of wilderness character) alternative for such administration. Programmatic MRAs for all management programs proposed in this CCP have been completed and appear in Appendix F to the CCP/EIS document.

Rationale for Objective:

While the programmatic MRAs already completed should address all management activities anticipated to occur in wilderness, they are generic to each class of activity and do not capture all the variables unique to each activity in wilderness. For this reason, activity-specific MRAs will be completed prior to each management action proposed to occur in wilderness. It is also possible that changed conditions or approaches to refuge management may require unanticipated management actions. These actions will require also MRAs, if they will occur in refuge wilderness.

Strategies for Accomplishing Objective:

1. Prior to undertaking each proposed management activity in wilderness, complete an activity specific MRA. This analysis will step-down from the activity's programmatic MRA and include variables specific to the activity, such as season, site-specific conditions, etc.
2. Conduct a MRA of each proposed new management activity identified. This analysis should resolve the following issues: Is the activity necessary to support administration of the area as a wilderness? Would any other activities having less impact on wilderness character achieve the same end? Do the means of accomplishing the activity create the minimum intrusion on wilderness feasible? In analyzing impacts to wilderness from an activity, the cumulative effects of each means of conducting the activity must be considered (e.g., use of rotary wing aircraft transport and power tools to execute a task in one day may have intense short term impacts, but these may be less than the cumulative impacts of deploying a work crew using hand tools and pack stock in the wilderness for six weeks to accomplish the same task). Activities that pass the minimum requirements test described above may be considered appropriate for implementation in the wilderness.
3. Establish standards for verifying that each activity carried out meets its MRA, including post-activity monitoring to detect impacts to the wilderness.

Objective 2:

Continue to remove abandoned vehicles as quickly as is feasible when they are identified on the refuge.

Current Status:

Many vehicles used in smuggling UDAs or narcotics across the refuge are abandoned when they become stuck or break down. Refuge staff removes vehicles abandoned in wilderness to a non-wilderness access point, where they are further removed by a commercial vehicle hauling service. Vehicles abandoned in non-wilderness are removed by a commercial service if they are accessible by public access road, otherwise they are towed to a public access road by refuge staff.

Rationale for Objective:

The presence of abandoned vehicles in refuge wilderness is disruptive to the sense of solitude, natural condition and untrammeled character called for in the Wilderness Act of 1964. Removing vehicles as soon as possible is consistent with the Wilderness Act.

Strategies for Accomplishing Objective:

1. With a refuge vehicle, pull the abandoned vehicle to the nearest public access road it crossed. When feasible, use the vehicle tracks as a pathway to avoid additional impacts to wilderness and new disturbance of desert soil.
2. If the abandoned vehicle has functional steering, a refuge staff member will ride in the towed vehicle and steer so as to keep it within existing vehicle ruts.
3. Investigate the feasibility and suitability of using heavy-lift military helicopters for removing vehicles, if any military units are interested in using this as a training opportunity.

Objective 3:

Within one year of plan adoption, discontinue all refuge management use (other than refuge law enforcement personnel engaged in border law enforcement in cooperation with Border Patrol) of administrative trails not required to provide management access as documented by minimum requirement analysis.

Current Status:

Approximately 234 kilometers (145 miles) of administrative trails occur within the wilderness portion of the refuge. These are unimproved or very lightly improved vehicle trackways established prior to wilderness designation in 1990. Refuge staff operates motor vehicles on these trails to accomplish approved management activities, subject to MRA, and Border Patrol agents operate motor vehicles on these trails to execute law enforcement activities consistent with the memorandum of understanding (MOU) between the Department of Homeland Security, the Department of the Interior and the Department of Agriculture. All other use of the administrative trails by any type of mechanized or motorized transport is prohibited.

Rationale for Objective:

The administrative trails, although primitive as compared to actual roads, are visible evidence of vehicular travel, and thus detract from the wilderness character of the refuge wilderness. Even infrequent use of the trails leaves enduring marks on the desert landscape. The presence of administrative trails may also invite unauthorized wilderness travel by otherwise authorized visitors traveling on the non-wilderness access corridors. Discontinuing refuge management use of administrative trails not necessary for administration of the refuge as a wilderness is consistent with the wilderness stewardship refuge purpose. It should be noted, however, that the refuge has no authority to close the administrative trails to use by border law enforcement personnel.

Strategiesy for Accomplishing Objective:

1. Close all trails not essential to management (see Figure K-2 for trails remaining open under this alternative). This is approximately 32 kilometers (20 miles) of administrative trails.
2. Post all closed trails as closed to any vehicular use on all refuge maps depicting the trails.
3. Where closed trails are accessible from one of the non-wilderness public routes, also post them closed at the access point.

Objective 4:

Continue to rehabilitate old vehicle trackways not officially part of the administrative trails network.

Current Status:

The *Final Programmatic Environmental Assessment for the Future Management of Cabeza Prieta National Wildlife Refuge and Draft Comprehensive Conservation Plan,* published in September of 1998, identified 224 kilometers (139 miles) of discernable vehicle trackways as not being part of the Administrative Trails system. These trails were slated for closure. Although the 1998 plan has not been implemented, these non-designated trails have not been considered part of the Administrative Trails system. The refuge has rehabilitated, and will continue to rehabilitate, such unofficial trails or other vehicle tracks in wilderness. Each year, refuge volunteers do a limited amount of rehabilitation to reclaim unauthorized trails in wilderness

Rationale for Objective:

Rehabilitating the old trackways to a natural appearance is consistent with preserving /restoring wilderness character and should have the additional benefit of discouraging their unauthorized use as roadways by smugglers of UDAs or Narcotics.

Strategies for Accomplishing Objective:

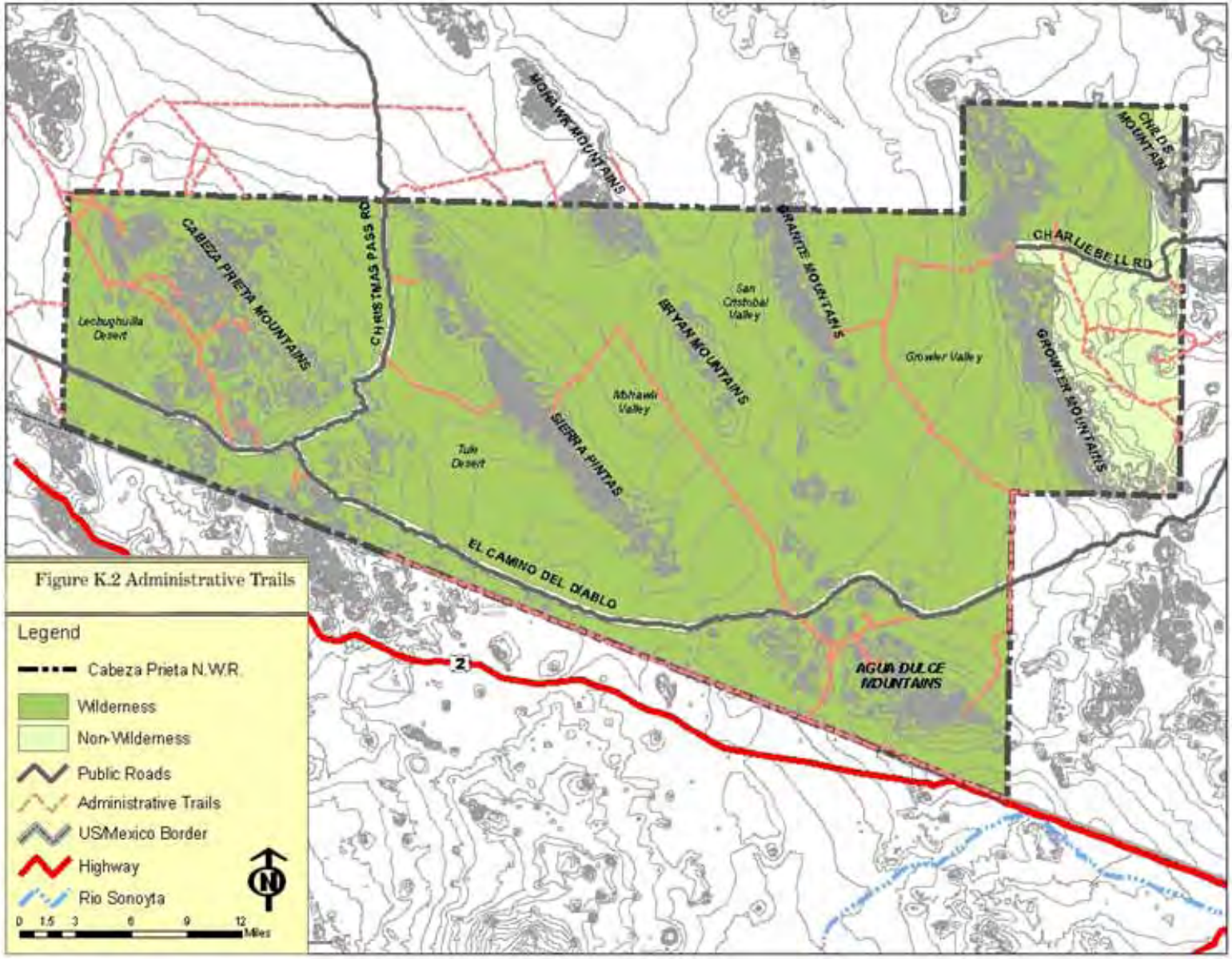
1 Where feasible, use naturally occurring materials to physically block entry to closed trackways from the access corridors or administrative trails. This is only recommended where terrain or vegetation define a fairly narrow entry to the trail being closed. In other cases blocking the entry to the trail may result in the trail entrance migrating around the barrier, creating new areas of impact to wilderness character.

2 Rehabilitate the old trackway to a natural appearance, using hand tools and natural materials from the immediate the area or live native plants taken from alongside the public access roads.

3 Where old trackways extend for some distance into the backcountry, rehabilitate the first 400 meters (1/4 mile) to obscure the end of the trackway.

Objective 5:

Within three years, develop a comprehensive outreach program to Border Patrol, Customs and other border law enforcement agency staff.


MOHAWK MOUNTAINS
CHRISTMAS PASS RD
CABEZA PRIETA MOUNTAINS
Lechuguilla Desert
BRYAN MOUNTAINS
San Cristobal Valley
GRANITE MOUNTAINS
CHARLIE BELL RD
CHILDS MOUNTAIN
Growler Valley
GROWLER MOUNTAINS
Mohawk Valley
Tule Desert
SIERRA PINTAS
EL CAMINO DEL DIABLO
AGUA DULCE MOUNTAINS
2
Figure K.2 Administrative Trails
Legend
Cabeza Prieta N.W.R.
Wilderness
Non-Wilderness
Public Roads
Administrative Trails
US/Mexico Border
Highway
Rio Sonoyta
N
0 1.5 3 6 9 12
Miles

Current Status:

The Arizona Desert Wilderness Act of 1990 provided for continued border law enforcement activities in the refuge wilderness, under an MOU between the Service and Border Patrol to avoid unnecessary degradation of wilderness. A national MOU was signed in 2006 between the Department of Homeland Security, Department of the Interior and Department of Agriculture to establish guidelines for cooperation on border law enforcement among bureaus of the agencies. The pre-exiting local MOUs between the refuge and the Yuma and Tucson area offices of the Border Patrol are rendered out of date by this new national MOU.

Most border law enforcement patrols use El Camino del Diablo and conduct daily helicopter reconnaissance. Patrols by vehicle are also allowed on refuge administrative trails in wilderness. Vehicles are used off of established refuge roads and administrative trails only in cases of rescue and arrest activities. The Border Patrol has also established a residential camp/command center (Camp Grip) on El Camino del Diablo and is currently in process of completing environmental compliance documents for additional residential camps along the Camino. These facilities have been located within the non-wilderness corridor, but are visible from surrounding wilderness.

In recent years undocumented alien traffic in and around the refuge has increased greatly, apparently in response to increased law enforcement in areas previously used more heavily. The refuge has been criticized for allowing border law enforcement agents to engage in unacceptable practices, such as vehicle use in wilderness, The refuge has presented training and orientation sessions for Border Patrol and Customs agents to increase their awareness of appropriate use of wilderness.

Rationale for Objective:

The recent increase in undocumented alien and smuggling traffic on the refuge has caused serious degradation of wilderness resources. Impacts from this traffic include development of a heavily used unofficial “highway” running northeast from the Camino del Diablo through the Mohawk and San Cristobal Valleys to an administrative trail in the Growler Valley, other readily observed vehicle trails and footpaths, large amounts of litter, and a great increase in the number of abandoned vehicles. Given these impacts, the refuge has a strong interest in accommodating and facilitating border law enforcement in any way possible, but must also work to ensure that such activities are as wilderness compatible as is feasible. Past outreach to Border Patrol has been successful, but periodic reassignment of agents necessitates an ongoing effort.

Strategies for Accomplishing Objective:

1. Continue to offer formal training and informal informational contacts to Border Patrol and Customs.
2. Draft updated MOUs with the local offices of the Border Patrol and obtain approval.
3. Develop a field use map for Border Patrol and Customs agents, depicting all administrative trails and including bulleted information about low impact wilderness travel.
4. Develop a training video covering wilderness issues and low impact techniques that can be viewed by reassigned agents prior to their deployment in wilderness.
5. Encourage cross training between Border Patrol, Customs and refuge law enforcement staffs.

Objective 7:

Remove at least 25 military tow darts or similar pieces of military debris from wilderness annually.

Current Status:

At least 1,600 pieces of large military debris, such as tow darts used as targets in air-to-air combat training, litter areas of the refuge wilderness. The Air Force has surveyed the refuge to identify locations of concentrations of such material. Unexploded ordnance is removed by the military as it is identified.

Rationale for Objective:

The presence of military debris is inconsistent with the Wilderness Act's definition of a designated wilderness as an area ". . . which generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable. . ."(Sec. 2 (c)). Metallic debris can also cause considerable visual impact due to glare from reflected sunlight.

Strategies for Accomplishing Objective:

1. Conduct minimum requirements analysis to identify appropriate means of removing debris. Consider use of pack stock, helicopter, and/or motor vehicles.
2. Schedule all removal activities during time of the year when impacts to refuge resources, particularly Sonoran pronghorn, will be minimized, and when visitation is low.
3. Solicit volunteer labor from Friends of the Cabeza Prieta and other groups interested in protecting the refuge's wilderness character.

Objective 8:

Continue to coordinate with military, other governmental, and private commercial lessees of communication sites on Childs Mountain to assure that all installations, buildings, and other equipment not essential to protecting human health and safety or efficient border law enforcement, are removed by 2018.

Current Status:

Childs Mountain has been used as a communications equipment site since construction of the Ajo Air Force Base (now closed) in 1956. Facilities current operating on the summit include an Air Force radar tower, several private communications facilities, and an Air Route Surveillance Radar-4 (ARSR-4) operated by the Federal Aviation Administration (FAA). The ARSR-4 is used as a civilian aircraft tracking system for civilian air traffic control, as well as Air Force, Border Patrol, and U.S. Customs Service.

The Service, Luke Air Force Base and the FAA entered into a MOU in 1998 to allow use of the summit for a 20-year period. According to that MOU, all facilities will be removed from the summit in 2018, at the end of the period. The MOU is subject to modification, however, and recent investments in upgrading equipment suggest that lessees may anticipate an extension of the equipment's tenure on Childs Mountain. The refuge and the Service support retaining those facilities necessary to the protection of human health and safety or U.S. national security beyond the 2018 expiration of the current MOU.

Rationale for Objective

Although the radar and communications site on the summit of Childs Mountain lies outside of the designated wilderness, developed facilities on the summit are prominently visible from large areas of the eastern portion of the wilderness. These facilities do not serve a refuge purpose and degrade wilderness character. For these reasons the refuge should avoid renewing or revising the MOU to extend the tenure of the facilities, except where they serve a vital health and safety or national security function.

Strategy for Accomplishing Objective

1. Notify all operators and owners of facilities on Childs Mountain that the current MOU may not be extended, so that they can explore alternative sites.

GOAL 3: VISITOR SERVICES MANAGEMENT

Provide visitors with compatible, high quality wildlife-dependent recreational and educational experiences designed to foster better appreciation, understanding and protection of the plant, animal and wilderness resources of Cabeza Prieta NWR.

Objective 1:

Continue to coordinate access permitting with the military and BLM.

Current Status:

Access to the refuge, other than the visitor center, is by permit only. The refuge, the BMGR and BLM issue joint public access permits. Permits are available at several locations, including the refuge office and visitor center in Ajo, Luke Air Force Base in Phoenix, Marine Corps Air Station Yuma in Yuma, Gila Bend Auxiliary Air Base in Gila Bend and the Bureau of Land Management Office in Phoenix. Visitors must contact the Auxiliary Air Base by telephone prior to entry and upon exit of the BMGR. Visitors must contact the refuge automated phone-in line prior to entering the refuge, but must not contact the line upon leaving the refuge. The refuge access permit serves as a hold harmless agreement protecting the military from any liability if refuge visitors are harmed by military activities or debris. Each recipient of an access permit also receives an informational packet outlining the rules and regulations for the BMGR and the Refuge. The refuge visitor center is staffed during normal business hours on weekdays year round, as well as on Saturdays during the winter months (October through April).

Rationale for Objective:

The current joint permit is a military requirement due to an on-going need to protect the military from liability related to potential visitor harm from current or previous military activity.

Strategy for Accomplishing Objective:

1. Continue to implement the current permit system.

Objective 2:

Within one year of plan adoption implement new vehicle restrictions. Travel trailers will not be allowed on the refuge non-wilderness access roads due to concerns about visitor safety. Licensed, street legal motorcycles and off road vehicles (as defined by the state of Arizona) will be permitted. Passenger vehicles and trucks will continue to require four-wheel-drive on el Camino del Diablo and Christmas Pass Road. Passenger vehicles and trucks using Charlie Bell Road will require high clearance, but two-wheel-drive will be allowed. A party size limit of four vehicles traveling together will be implemented to reduce impact of large caravans.

Current Status:

Visitors intending to drive on El Camino del Diablo or Christmas Pass Road must have a vehicle with four-wheel-drive (4WD). Two-wheel-drive, high-clearance vehicles are permitted on Charlie Bell Road. Motorcycles, off-road recreational vehicles and travel trailer are not specifically denied access to the refuge. There is no party size restriction.

Rationale for Objective:

The restriction of travel trailers is aimed at reducing the amount of visitor rescue necessary. Vehicles pulling travel trailers have a greater likelihood of becoming stuck on the primitive refuge roads. Licensed, street-legal motorcycles and off-road vehicles will be allowed on the refuge as there is no rationale for prohibiting legal vehicles that are capable of safely transiting the refuge non-wilderness roads. Restricting party size will allow control of large caravans traveling together by requiring a special use permit.

Strategies for Accomplishing Objective:

1. Provide information detailing the new vehicle restrictions in all visitor outreach information.
2. Post signs clearly explaining the restrictions at all points of entry to the refuge.
3. Continue to restrict vehicle use to traveled road surface, allowing pull-offs for parking or passing within the center 30 meters (100 feet) of the 60 meter (200 foot) non-wilderness public access corridors through the wilderness.
4. Refuge law enforcement personnel will cite visitors using unauthorized types of vehicles.
5. Implement that all motorcycles and ATVs must be fitted with a mast displaying an orange flag at least 2.4 meters (8 feet) off the ground. The flag's area must equal or exceed 0.5 square meter (80 square inches).
6. Parties of five or more vehicles traveling together will require a Special Use Permit.

Objective 3:

Upon plan adoption establish new visitor camping regulations in order to limit impacts to the wilderness resource and other natural resources.

Current Status:

The following restrictions currently apply to visitors camping on the refuge. No camping is allowed within 400 meters (1/4 mile) of any wildlife water, fires are restricted to charcoal or camp stoves and the maximum length of stay is 14 consecutive days. There are three developed, vehicle accessible, primitive camping areas with minimal amenities at Papago Well, Tule Well and Christmas Pass. There is no restriction on visitor group size.

Rationale for Objective:

Camping is considered an appropriate use on the refuge in support of hunting and wildlife observation due to the remoteness of the refuge, difficulty of access and twilight or nocturnal activity of many desert wildlife species. Camping has the potential to adversely affect wilderness character and other refuge resources if not adequately managed. Fire restrictions at the established campsites are necessary to prevent consumption of dead wood that provides habitat for desert insects. Fire restrictions are not necessary in the refuge backcountry, due to the dispersed nature and very low rate camping in the backcountry. Length of stay restrictions are typically used on public lands allowing camping to facilitate tracking of visitor use and prevent "squatting" or permanent occupation of public land. Party size restrictions protect the wilderness and other natural resources of the refuge. Larger camping and hiking parties tend to create far greater impacts than do smaller parties using similar camping and travel techniques (see Monz et al., 2000, for a discussion of reasons to limit party size in wilderness).

Strategies for Accomplishing Objective:

1. Continue to prohibit camping within 400 meters (1/4) mile of any wildlife water.
2. Continue to limit recreational visitors' length of stay to 14 consecutive days.
3. Implement recreational visitor party size limitation of four vehicles or eight persons.
4. Allow larger parties and longer visits on a case-by-case basis by special use permit
5. Allow back-country users (those hiking and not camping at the three established, vehicle accessible campsites) to use dead and downed wood for campfires. At the established campsites, allow wood fires using wood hauled into the refuge that is readily identifiable as wood not native to the refuge (pine, construction waste lumber, etc.).

Objective 4:

Retain exiting pack and saddle stock regulations.

Current Status:

Virtually all use of pack and saddle stock on the refuge has been by desert bighorn sheep hunters, but any refuge visitor could use stock, subject to a special use permit. Restrictions of the special use permit for pack and saddle stock include: a maximum of four horses, burros or mules per party; travel only on the administrative trails, dry washes and along the base of the mountain ranges; no grazing on the refuge or use of refuge water holes, tinajas, tanks, etc. to water stock; feed pellets or processed and pelletized feed only while on the refuge and for three days prior to entry. There are five designated stock camps along the refuge public access roads: Daniel's Arroyo, Lower Well, Agua Dulce, O'Neil Hills, Christmas Pass, Coyote Wash and Tule Tank (1 mile east of Tule Well). Long term camping (more than two nights) with pack or saddle stock is allowed only in these designated stock camps, all surface disturbance at campsites must be restored and all trash and animal waste must be removed from the camps.

Rationale for Objectives:

Control of pack and saddle stock, through the requirement of a special use permit with restrictions, is appropriate due to the much greater impacts on campsites and trails caused by pack and saddle stock versus hikers (Spildie et al., 2000).

Strategies for Accomplishing Objective:

1. Provide notice that a special use permit is necessary for pack or saddle stock on the refuge.
2. Provide information regarding the responsibilities of pack and saddle stock users with all permits issued to such users.

Objective 5:

Within ten years of plan adoption, develop a revised hunt program for implementation as conditions warrant.

Current Condition:

A desert bighorn sheep hunt occurs on the refuge each year during the month of December. In cooperation and coordination with AGFD, the refuge establishes the number of sheep hunting permits that will be issued, based on the size of the refuge desert bighorn sheep population. Since hunting began in 1968, the number of permits issued has ranged between seven and one per year. No other hunting is currently allowed on the refuge.

Rationale for Objective:

Hunting is one of the six wildlife dependent public uses and should be permitted on National Wildlife Refuges when compatible with the refuge purpose(s). Although data on population numbers are not currently sufficient to evaluate the appropriateness of hunting other species, hunting mule deer and predators (primarily coyote) on the refuge may be determined compatible when the refuge Sonoran pronghorn population has recovered sufficiently to allow hunting within the range of Sonoran pronghorn. Mule deer compete with Sonoran pronghorn for forage and water resources. Managing the refuge mule deer population could thus benefit the pronghorn population. Predator hunts could be beneficial if coyote become established on the refuge at greater than natural densities.

Strategies for Accomplishing Objective:

1. Continue to offer a desert bighorn sheep hunt in coordination with AGFD, setting permit numbers based on the refuge sheep population.
2. If results of population surveys indicate that the refuge mule deer herd would sustain hunting, and the U.S. Sonoran pronghorn population would not be jeopardized by a hunt in its range, conduct a compatibility determination for a mule deer hunt.
3. If results of population surveys indicate that coyote numbers on the refuge unnaturally high and predator hunts are consistent with refuge management, conduct a compatibility determination for a public refuge predator hunt.
4. In cooperation with AGFD, implement mule deer or predator hunt, as determined compatible. Monitor hunt for any adverse effects to refuge wildlife populations.

Objective 6:

Continue to ensure that the leave-no-trace (LNT) ethic of wilderness use and travel is reflected in the refuge's provision of visitor services and that LNT information is available to visitors.

Current Status:

LNT brochures are provided to all bighorn sheep hunters and back country campers.

Rationale for Objective:

Staff training and up-to-date public information on LNT will help to ensure that visitor use activities are consistent with protection of wilderness character.

Strategies for Accomplishing Objective:

1. Ensure that all refuge visitor contact and field staff as well as refuge volunteers have opportunities to be trained in LNT techniques at least every other year.
2. Provide LNT information to all refuge backcountry visitors.
3. Submit all LNT visitor information brochures to the Service Regional Wilderness Coordinator annually for review.

Objective 7:

Within five years, acquire a 12-hectare (30-acre) site adjacent to the refuge office site, develop an interpretive trail and develop additional interpretive materials for site.

Current Status:

In November of 1940, Executive Order 8598 set aside 16 hectares (40 acres) in Ajo for an administrative site. In 1969, Public Land Order 46171 revoked 12 hectares (30 acres) of that withdrawal and returned it to the state. A visitor center was built in 1980 on the remaining 4 hectares (10 acres). There is a short interpretive trail on the 4-hectare site, but lack of space and existing administrative facilities on the site limit the length and variety of that trail. The refuge has investigated leasing or purchasing the revoked 12 hectares (30 acres) to add an interpretive trail to the visitor center.

Rationale for Objective:

Visitors to Ajo, Arizona have access to some interpretive materials at the existing refuge office and visitor center, but must travel some distance on poor roads to experience the refuge resources. An improved interpretive trail adjacent to the office and visitor center would allow visitors to become acquainted with a range of Sonoran Desert vegetation and interpretive materials at an easily accessed location. An interpretive trail and other site interpretation at this location would also greatly facilitate the refuge's ability to conduct interpretive and educational programs for area schools, residents and visitors.

Strategies for Accomplishing Objective:

1. Service Regional Office realty staff will enter negotiations with the State of Arizona for the purchase or long-term lease of the 12-hectare (30-acre) parcel.
2. Upon purchase or lease of the property, the refuge, in coordination with the Service Regional Office Division of Visitor Services, will contract for a landscape design incorporating a trail, native landscape plantings, interpretive panels, and self-guided interpretive tour.

Objective 8:

Within ten years of Plan Adoption expand the visitor center/Administrative Office Complex, and develop new interpretive and educational materials for the visitor center.

Current Status:

The visitor center was built in 1980. It houses a small exhibit room with some interpretive materials and modest video screening facilities as well as the refuge administrative offices. Interpretive materials in the visitor center include cultural artifacts, wildlife life taxidermy mounts, a variety of interpretive brochures and a refuge orientation video.

Rationale for Objective:

Refuge visitation and staff have both grown since the construction of the visitor center in 1980. A larger visitor center/Administrative Office would accommodate present and future visitation levels and staff numbers. Developing new interpretive and educational materials is appropriate to reflect current resource knowledge, as well as interpret recent developments such as the precipitous decrease in Sonoran pronghorn on the refuge and the great increase in illegal traffic on the refuge.

Strategies to Accomplish Objective:

1. Contract with vendors to develop plans for enlarged visitor center/administrative building.
2. Develop an updated refuge orientation video.
3. In cooperation with Regional Office Visitor Services staff, develop interpretive and educational materials for the refuge.
4. If grant funding is obtained, construct accessible trail and overlook with shade structure and

interpretive panels for desert pupfish refugium on visitor center site.

Objective 9:

Within eight years of plan adoption increase opportunities for self-guided interpretive public activities in the refuge non-wilderness.

Current Status:

Other than the exhibits at the visitor center and its site, there are no interpreted sites available to the general public on the refuge. The interpretive panels on the Childs Mountain Watchable Wildlife station are not generally available, as they can only be accessed by guided tour groups under current management restrictions.

Rationale for Objective:

Interpretation is one of the six priority public uses of National Wildlife Refuges. Providing additional self-guided interpretive opportunities will lead to greater visitor appreciation and understanding of refuge resources.

Strategies for Accomplishing Objective:

1. Continue to offer guided tours of the Childs Mountain Watchable Wildlife site.
2. Coordinate with BLM to redevelop a public access road loop in the non-wilderness portion of the Childs Valley. This road would only be open to public use after a determination that such use would not jeopardize the Sonoran pronghorn.
3. Develop interpretive signage at overlooks and other suitable locations along the Childs Mountain Road and the Childs Valley loop road.
4. Develop additional interpretive pamphlets regarding the beneficial attributes of bats, such as plant pollination.
5. Continue to participate annually in the Sonoran Shindig.

GOAL 4: CULTURAL RESOURCES MANAGEMENT

Protect, maintain and interpret cultural and historic resources on Cabeza Prieta NWR, in cooperation with Tribal governments and the State of Arizona to benefit present and future generations.

Objective 1:

Continue to protect refuge cultural and historic resources through pre-disturbance surveys and resource assessment.

Current Status:

The refuge conducts on-site, pre-disturbance surveys prior to any work requiring disturbance of soil. In 2001 the *Cultural Resources Overview and Assessment, Cabeza Prieta National Wildlife Refuge* was completed. This analysis of records of cultural resources on the refuge provides information about prehistoric use and settlement patterns on the land that became the refuge.

Rationale for Objective:

The National Historic Preservation Act established a responsibility for cultural resources protection on all federal lands. Cultural resource awareness and protection also produces good will with the Tohono O'odham Nation and Hia-Ced O'odham band, which have cultural links to the refuge lands.

Strategies for Accomplishing Objective:

1. Require archaeological review to be completed prior to any work on the refuge that will require disturbance of the soil surface.
2. Consult with the Tohono O'odham Tribe and Hia-Ced O'odham band prior to permitting any archaeological research on refuge lands.
3. Continue to update refuge cultural resources records as cultural resources are discovered on the refuge. Location information in these records will not be disclosed to the public in order to protect sensitive cultural sites.
4. Continue to allow Archaeological Site Stewards, an Arizona registered volunteer association, to survey the refuge for cultural and historic sites.

Objective 2:

Within three years of plan adoption, develop and implement standards for cultural resources interpretation.

Current Status:

Some artifacts are interpreted at the refuge visitor center.

Rationale for Objective:

Interpretation of refuge cultural resources is consistent with their protection, provided that no on-site interpretation calls attention to fragile prehistoric cultural resources that might be subject to damage or removal by collectors.

Strategies for Accomplishing Objective:

1. Develop interpretive materials for the old Ajo landfill on the visitor center site. These materials would deal with the early twentieth century history of Ajo.
2. Update generalized cultural and historic brochure for the refuge.
3. Continue to display interpretive cultural artifacts at the visitor center, but do not remove any additional artifacts from their context in the refuge.
4. Do not develop any site-specific interpretive materials for cultural resources on the refuge.

Objective 3:

Within three year of plan adoption, implement periodic inspections of known cultural sites to identify and mitigate disturbance.

Current Status:

No regular, formal inspection of cultural sites occurs, although staff inspects sites from time to time.

Rationale for Objective:

Regular inspections of, and mitigation of damage to, cultural sites on the refuge will keep these sites intact for future research when archaeological techniques have improved to reveal more about the prehistoric use of the refuge lands.

Strategies for Accomplishing Objective:

1. Refuge staff will annually visit each known archaeological site and inspect for damage.
2. Where sites have suffered damage, the refuge will develop and implement stabilization measures, in coordination with the regional cultural resources officer
3. Refuge law enforcement staff will periodically patrol known sites to apprehend unauthorized individuals and discourage unauthorized entry.
4. The refuge will provide training to border law enforcement personnel regarding the sensitivity of refuge cultural resources and avoidance of damage to such resources during border law enforcement operations.

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Appendix N: Intra-Service Biological Opinion for the Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan, Arizona

United States Department of the Interior
U.S. Fish and Wildlife Service
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Telephone: (602) 242-0210 FAX: (602) 242-2513

In Reply Refer To:
AESO/SE
22410-2006-F-0416

August 22, 2006

Memorandum

To: Refuge Manager, Cabeza Prieta National Wildlife Refuge, Ajo, Arizona

From: Field Supervisor

Subject: Intra-Service Biological Opinion for the Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan, Arizona

Thank you for your request for formal intra-service consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated May 5, 2006, and received by us on May 12, 2006. At issue are impacts that may result from implementation of your proposed Comprehensive Conservation Plan (CCP) on the Cabeza Prieta National Wildlife Refuge (CPNWR) in Yuma and Pima counties, Arizona. The proposed action may affect Sonoran pronghorn (*Antilocapra americana sonoriensis*) and lesser long-nosed bats (*Leptonycteris curasoae yerbabuenae*).

This biological opinion is based on information provided in the "Working Final Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan Environmental Impact Statement and Draft Wilderness Stewardship Plan, June 2006" (WFEIS) and other sources of information as described in the consultation history. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern; management, monitoring, and recreational activities and their effects; or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at the Phoenix, Arizona, Ecological Services Office (AESO).

CONSULTATION HISTORY

- July 25, 2005: We attended your Public Hearing in Tucson that was held to solicit public comment on draft documents to be used to prepare the CCP.
- April 6, 2006: We received an electronic mail requesting our review and approval of your Final Intra-Service Section 7 Biological Evaluation Form (BEF). In this form you requested our concurrence that implementation of the CCP will have no effect on the cactus ferruginous

pygmy-owl (*Glaucidium brasilianum cactorum*)[1] and lesser long-nosed bat and that it may affect, but will not likely adversely affect, pronghorn.

- April 10, 2006: We sent you an electronic mail regarding your effects determinations in the BEF and stated we believed that implementation of the CCP will likely adversely affect the Sonoran pronghorn and lesser long-nosed bat.
- April 11, 2006: We spoke with you regarding our April 10 correspondence. During this conversation you agreed with our recommendations regarding effects determinations and agreed to request formal Intra-Service section 7 consultation.
- May 12, 2006: We received your letter and revised BEF, dated May 5, 2006, requesting formal consultation on the proposed action and its effects on the Sonoran pronghorn and lesser long-nosed bat.
- May 19, 2006: We sent you a letter initiating formal consultation (consultation period beginning on May 12, 2006). In this letter, we additionally stated that we would not be formally consulting on the cactus ferruginous pygmy-owl because it was removed from the Federal List of Endangered and Threatened Wildlife.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The CPNWR proposes to implement the CCP and Wilderness Stewardship Plan for the CPNWR (Figure 1), located in Yuma and Pima counties in southwestern Arizona. The FWS is required to prepare CCPs by the National Wildlife Refuge System Improvement Act (P.L. 105-57) passed in 1997. The CCP describes the desired future condition of the CPNWR and provides long-range guidance and management direction for the CPNWR for the next 15 years.

The description of the proposed action is described primarily in "Elements Common to All Alternatives" (Section 2.1) and "Alternative 4 (Proposed Alternative): Active Management" (Section 2.5) of the WFEIS. A portion of the proposed action is described in "Alternative 5: Maximum Effort" (Section 2.6). Specifically, section 2.6.1.1.1.2 will replace section 2.5.1.1.1.2 and section 2.6.1.1.1.5 shall replace section 2.5.1.1.1.5. These two changes are related to implementing the Sonoran pronghorn recovery plan and reflect the CPNWRs current understanding of the importance of water and forage during drought periods for Sonoran pronghorn. Additionally, section 1.12.2 includes "Issues Covered by Existing Policy, Law, or Regulations and Common to All Alternatives".
The CCP includes both existing actions that will be carried forward and new actions. As summarized below, it proposes wildlife and habitat management, including species recovery and

[1] Since the issuance of the April 6 BEF, the pygmy-owl was removed from the Federal List of Endangered and Threatened Wildlife and, accordingly, its designated critical habitat was also removed. We also withdrew the proposed rule to designate new critical habitat for the pygmy-owl (U.S. Fish and Wildlife Service 2006). We continue, however, to strongly encourage the continued implementation of monitoring and conservation activities included in the CCP for pygmy-owls.

conservation activities; wilderness stewardship; visitor service management; cultural resources management; and staffing level increases.

Wildlife and Habitat Management

As part of the CCP, the CPNWR will implement existing and new recovery and conservation activities for listed and non-listed species. To recover and conserve the Sonoran pronghorn, the CPNWR will: 1) implement Sonoran Pronghorn Recovery Plan (U.S. Fish and Wildlife Service 2002) actions; 2) monitor the U.S. sub-population of Sonoran pronghorn (this includes capturing and radio-collaring approximately 10% of the population; tracking radio-collared animals weekly using aerial radio-telemetry methods; tracking uncollared pronghorn weekly using visual surveys; conducting U.S. sub-population counts every two years; 3) develop additional, upgrade existing, and maintain all pronghorn waters (22 developed waters currently occur on the CPNWR); 4) implement the captive breeding program which includes maintaining a semi-captive breeding pen on the CPNWR and translocation of animals; 5) restrict public access to pronghorn habitat during the fawning season[2], until it has been determined that the U.S. subpopulation of Sonoran pronghorn has stabilized (i.e., either it has met the criteria for downlisting described in the "Status of the Species" and it has been downlisted or the environmental documents are being processed to finalize the downlisting, or the pronghorn population has remained stable with over 200 individuals for several years; Curtis McCasland, CPNWR, personal communication, June 30, 2006); 6) enhance forage for pronghorn (six forage enhancement plots currently occur on or near the CPNWR; additional enhancements are proposed); 7) conduct predator management (including conducting research on coyotes, reviewing data on coyote predation on pronghorn, and selectively removing coyotes based on results from research).

Though pronghorn recovery and conservation activities numbers 1, 2, and 4 (implementation of certain components of the Recovery Plan, capturing, monitoring, and implementing the captive breeding program) above are included as part of the proposed action for the CCP, these activities and take that could occur as a result of them are subject to a separate permitting process under section 10(a)(1)(A) of the Act. The 10(a)(1)(A) permits that have been issued for the aforementioned activities, as well as other pronghorn related research activities, are currently undergoing Intra-Service section 7 consultation (consultation number 22410-2006-F-0546).

To recover and conserve the lesser long-nosed bat, the CPNWR will: 1) protect the Bluebird Mine maternity roost from human disturbance through restricting access to, maintaining fencing (~ nine foot steel fence to discourage human entry) around, and monitoring the roost site; 2) develop and place a bat-friendly gate at the entrance of the maternity roost if the fencing fails to keep illegal immigrants/smugglers out; and 3) survey for additional, unknown roost sites on the

[2] The eastern three-quarters of the CPNWR (roughly from five miles east of Tule Well to the eastern boundary) is generally closed to public access from March 15 to July 15. During wet years, however, the eastern three-quarters of the CPNWR may be closed at a later date, such as April 1, if the CPNWR receives concurrence from the Arizona Ecological Services Office and the Sonoran pronghorn recovery team that a later closure date will not affect pronghorn. Administrative access to the eastern portion of the CPNWR is not restricted, however, CPNWR staff always implement measures to avoid and/or minimize impacts to pronghorn year-round.

CPNWR. The endangered desert pupfish (*Cyprinodon macularius*) is not known to have ever naturally occurred on the CPNWR, however a refugium for pupfish was developed at the visitor center, and CPNWR staff will continue to maintain and monitor the population. .
Though lesser long-nosed bat monitoring and pupfish refugium maintenance and monitoring are included as part of the proposed action for the CCP, these activities and take that could occur as a result of them are subject to a separate permitting process under 10(a)(1)(A) of the Act.
The 10(a)(1)(A) permits that have been issued for the aforementioned activities, as well as other lesser long-nosed bat and pupfish related research activities, are currently undergoing Intra-Service section 7 consultation (consultation numbers 22410-2006-F-0548 and 22410-2006-F-0548).

Though Peirson's milkvetch (*Astragalus magdalenae peirsonii*) has not been documented on the CPNWR, CPNWR staff will conduct periodic surveys in suitable habitat (Pinta Sands) for this threatened plant. Because potential habitat for cactus ferruginous pygmy-owls occurs in areas on the CPNWR (two records of the owl exist from the CPNWR), CPNWR staff will develop a monitoring protocol to survey potential pygmy-owl habitat and continue to monitor the presence and number (if present) of pygmy-owls.

To conserve and mange desert bighorn sheep, the CPNWR will: 1) continue to monitor populations using standard aerial techniques every three years; 2) pending the results of a sheep/water relationship study, continue to haul supplemental water to existing bighorn sheep waters in wilderness and non-wilderness areas; 3) upgrade existing developed waters in wilderness; 4) develop additional waters if research indicates that additional waters would benefit sheep; 5) remove waters if research indicates that they do not benefit sheep; 6) conduct studies, which will include radio-collaring animals, to investigate mountain lion and bighorn sheep interactions.

The CPNWR will continue, as funding permits, to monitor and survey, initiate research on, and/or establish and implement protocols for inventorying and monitoring a variety of species, including birds and herpetofauna of concern and mule deer. The CPNWR will also continue, as funding permits, to conduct long-term monitoring; including monitoring vegetation transects and every two years, taking and analyzing aerial photographs of the CPNWR to detect changes in the plant community.

The CPNWR will continue to document new occurrences of exotic plants and attempt to limit their spread where feasible. The CPNWR will work with the Mexican government to identify means of controlling the spread of exotic plants along Mexican Highway 2. The CPNWR will also remove trespass livestock, which can cause a variety of problems on the CPNWR, including introducing exotic plants, spreading disease to wildlife, competing with wildlife for forage resources, etc.

Additionally, the CPNWR will continue to conduct and support biological research on the CPNWR such as implementing research goals of the Sonoran pronghorn recovery effort and facilitating and supporting research on desert bighorn sheep, herpetofauna, birds, exotic invasives, and other species, as well on ecosystem integrity by academics and other experts.

Wilderness Stewardship

CPNWR management and operations will continue to strive to protect the character of the designated wilderness[3], so that it meets the definition found in the Wilderness Act of 1964. The CPNWR will streamline the minimum requirements analysis (MRA) process by establishing programmatic MRAs for all predictable, recurring activities, such as water hauling, wildlife surveys, removal of abandoned vehicles, and water sample collection, which require generally prohibited uses of wilderness. Though activity-specific MRAs will still be prepared, the programmatic MRAs will simplify the preparation process.

The CPNWR will continue to remove abandoned vehicles, taking care to limit damage to vegetation and the soil surface, when they are found. In the case of vehicles abandoned in wilderness, CPNWR staff will tow the vehicle, along its entry track whenever feasible, to the nearest non-wilderness road using a CPNWR vehicle. The vehicle will be hauled off of the CPNWR by a commercial towing company once removed to a road outside of wilderness. The CPNWR will also examine the feasibility of entering into a memorandum of agreement with adjacent military commands to make heavy-lift military helicopters available for removing abandoned vehicles from CPNWR wilderness.

The CPNWR will continue to notify and coordinate with the military to remove unexploded ordnance as it is found. Additionally, the CPNWR will coordinate with the military and volunteers to remove tow darts and tow cable from the CPNWR, using appropriate means in wilderness to accomplish the removal.

The CPNWR will close 20 miles of administrative trails to management vehicular use. The trails will, however, remain available to border law enforcement use under the provisions of the Arizona Desert Wilderness Act of 1990. Management use of the administrative trails not closed will continue to require an MRA. CPNWR back-country visitors will be encouraged to hike on administrative trails in order to concentrate user impacts on already affected areas. If future

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[3] The Arizona Desert Wilderness Act of 1990 designated 93 percent of the CPNWR area as Federal Wilderness. This wilderness is administered in compliance with the Wilderness Act of 1964, with the exception that the 1990 Act included provisions to allow some generally prohibited uses in order to facilitate border law enforcement and military training activities. The Wilderness Act of 1964 lists uses that are generally prohibited within designated wilderness unless the use is necessary to meet the minimum requirements for administration of the area as wilderness (a "minimum requirements analysis" (MRA) is conducted to determine if a proposed activity is appropriate). These generally prohibited uses are: any temporary road, use of motor vehicles, motorized equipment or motor boats, landing of aircraft, any other form of mechanical transport or any structure or installation. In addition to such uses, which are generally prohibited, but may be allowed as the minimum requirement to administer the area as wilderness, the Wilderness Act of 1964 also prohibits two uses in wilderness unconditionally: commercial enterprises and permanent roads.

changes in management regime result in permanent cessation of all water hauling, all the administrative trails will be closed to management use.

The CPNWR will develop an aerial photography program to monitor impacts of trails created by illegal immigrants or drug smugglers crossing the CPNWR. CPNWR staff will maintain a database of all observed adverse impacts to wilderness, including impacts caused by management, illegal activities, border law enforcement, and visitor use.

In response to increased illegal traffic in the CPNWR, border law enforcement has increased. Though interagency agreements[4] exist to minimize impacts from border law enforcement activities, some restrictions in the agreements may be relaxed so that border law enforcement can respond to increased illegal activity on the CPNWR (for example, the Department of Homeland Security (DHS) is currently implementing their Arizona Border Control Plan in response to increased illegal traffic). The CPNWR will continue to present training and orientation sessions for Customs and Border Protection (CBP), Office of Border Patrol (OBP), and Drug Enforcement Administration (DEA) agents to increase their awareness of appropriate operations in wilderness, and assist OBP in preparation of a training video that provides guidelines on low impact wilderness travel techniques.

CPNWR law enforcement staff participates in the Border Anti-Narcotics Network (BANN), a combined effort among local and federal law enforcement agencies to combat narcotics trafficking. CPNWR law enforcement will continue to participate in a collaborative effort to combat narcotics trafficking and assist OBP in apprehending undocumented aliens on the CPNWR. The CPNWR and OBP deploy, monitor, and maintain a network of remotely operated sensors (magnetometers) to detect vehicles and pedestrians moving in proximity to the border. The CPNWR will continue to allow currently permitted uses of the Childs Mountain communications site, and will renew permits as deemed necessary for human safety and efficient law enforcement. The CPNWR will maintain a current inventory of all permitted uses and prevent any increase of the development footprint. The CPNWR will work with the military to identify any obsolete buildings or other structures and have them removed. At the end of the current use agreement, the CPNWR will work with the Federal Aviation Administration and military to renew the agreement or have the facilities removed, if no longer needed for human health, safety, and national security.

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[4] The Arizona Desert Wilderness Act of 1990 specifically states that designation of wilderness lands within the CPNWR will not preclude or otherwise affect continued border operations by the Immigration and Naturalization Service (now the U.S. Citizenship and Immigration Services, part of the Department of Homeland Security (DHS)), the Drug Enforcement Administration, or the United States Customs Service (now U.S. Customs and Border Protection, also part of the DHS), in accordance with interagency agreements. Interagency and Interdepartmental agreements (i.e., the "Interagency Agreement (IA) Between FWS CPNWR Ajo, AZ and Immigration and Naturalization Service U.S. Border Patrol Yuma Sector Yuma, AZ" signed in 1999 and the "Memorandum of Understanding (MOU) Among DHS and U.S. Department of the Interior and U.S. Department of Agriculture Regarding Cooperative National Security and Counterterrorism Efforts on Federal Lands along the United States' Borders" signed in 2006), currently in effect between Federal border law enforcement agencies and the FWS include limitation of routine patrol vehicle use to public roads; use of CPNWR administrative trails only to investigate sensor activity, engage in pursuit activity, and search and rescue operation; and limit off-road travel to emergency situations.

Additionally, the CPNWR will continue to annually survey 25 designated monitoring areas located along all public use roads and administrative trails for impacts to wilderness and will continue monitoring campsites to record the number, size, location, and condition of campsites on the CPNWR. These surveys will be conducted as staff time and availability allow.

Visitor Services Management

Access to the CPNWR, other than the Visitor Center, is by permit only. To obtain a more accurate count of CPNWR visitors than is available from counting permit numbers, the CPNWR has established an automated call-in line. The CPNWR access permit includes the telephone number and requests that all visitors call prior to entry and leave the following information: permit number for each person in the party, date of entry, destination, length of visit, and number of vehicles in the party. There is no requirement to call the CPNWR telephone number upon leaving the CPNWR. This information is used by the CPNWR to track numbers of visitors and routes of travel in the refuge.

El Camino del Diablo and Christmas Pass Road will remain restricted to four-wheel-drive, high clearance vehicles only. Charlie Bell Road will remain restricted to high clearance vehicles only (two-wheel-drive permitted). Vehicles will remain restricted to the established roadway for normal travel, with the center 100 feet of the 200-foot, non-wilderness travel corridors along el Camino del Diablo and Christmas Pass Road available for pull-off and passing. Motor vehicles and mechanical transport will remain prohibited in designated wilderness. Parties of five or more vehicles traveling together will require a special use permit. Street-legal, registered all-terrain vehicles and motorcycles will also be allowed on the non-wilderness access roads.

Pack and saddle stock will be allowed only by special use permit. Restrictions of the special use permit for pack and saddle stock will include: 1) a maximum of four horses, burros, or mules per party will be allowed; 2) travel only be allowed on the administrative trails, dry washes, and along the base of the mountain ranges; 3) no grazing will be allowed on the CPNWR or use of CPNWR water holes, tinajas, tanks, etc. to water stock; 4) only pellets or processed and pelletized feed will be allowed while on the CPNWR and for three days prior to entry; 5) long-term stock camps (more than 2 nights) will be permitted only in the seven designated areas: Daniel's Arroyo, Lower Well, Agua Dulce, O'Neil Hills, Christmas Pass, Coyote Wash, and Tule Tank 1 mile east of Tule Well; 6) all surface disturbance at campsites must be restored; and 7) all trash and animal waste must be removed from base camps. All visitors to wilderness will receive orientation information on Leave-No-Trace wilderness use techniques.

The CPNWR will continue to offer a limited (between one to eight tags per years) desert bighorn sheep hunt, under a CPNWR special use permit that includes the same restrictions as those described above. Should the results of the game animal population surveys indicate that CPNWR populations of mule deer, quail, dove, and rabbit are sufficient to support hunting, the CPNWR will implement hunts for these species as well. The hunts will be only be implemented upon a determination that the U.S. subpopulation of Sonoran pronghorn has stabilized and would

not be jeopardized by such a hunt and if adequate law enforcement is available to enforce CPNWR regulations during such hunts.

Public predator hunts for coyote, bobcat, and mountain lion may be authorized on the CPNWR if: 1) it is determined that such hunts would benefit Sonoran pronghorn populations; 2) predator populations can sustain hunting; and 3) the U.S. subpopulation of Sonoran pronghorn has stabilized and would not be jeopardized by such a hunt.

The CPNWR will continue to participate in a binational, multi-partner environmental education program designed to teach youth about the Sonoran Desert ecosystem. The CPNWR will continue to give natural history presentations at local schools and will also develop a Sonoran Desert ecosystem-specific environmental education program for use by staff in schools and other venues.

The CPNWR will continue to provide interpretive services and will also expand interpretive facilities, displays, and services at the CPNWR headquarters. The Childs Mountain Watchable Wildlife site will continue to be open only to guided tours due to safety constraints. The CPNWR will develop additional interpretive signage and overlooks in non-wilderness areas and will investigate the feasibility of developing a loop road in the non-wilderness portion of the Childs Valley in cooperation with BLM if the CPNWR determines that Sonoran pronghorn populations have stabilized and that such use would not jeopardize the subspecies. Additionally, should the CPNWR acquire a 30-acre site adjacent to the current visitor center, the CPNWR will develop an expanded interpretive trail on that site.

The CPNWR will continue to implement the Leave-No-Trace program to educate and encourage visitors to reduce their impacts on the CPNWR. The CPNWR will continue to allow both back-country and vehicle accessible camping. Rules will be enforced to protect CPNWR resources and maintain wilderness character, as follows: 1) camping will be prohibited within 1/4 mile of any wildlife water; 2) campfires using native fuels will be allowed in the backcountry; 3) at the established campsites, fires will be allowed only if made with wood fuel brought in from off the CPNWR; 4) the maximum length of stay will be 14 consecutive days; and 5) parties of more than eight campers will require a special use permit. Three developed, vehicle accessible primitive camping areas with minimal amenities will be retained at Papago Well, Tule Well, and Christmas Pass.

Cultural Resources Management

All management activities on the CPNWR will be in compliance with Section 106 of the National Historic Preservation Act. CPNWR staff will consult with appropriate Tribes regarding any archeological surveys proposed by researchers on the CPNWR. The CPNWR will not conduct any inventory of cultural resources, however, CPNWR law enforcement staff will periodically patrol known sites to apprehend unauthorized individuals and discourage unauthorized entry.

Staffing

In order to implement the CCP, the CPNWR will need to add three full time positions (wildlife biologist, maintenance worker, and law enforcement officer).

Issues Covered by Existing Policy, Law, or Regulations

Border Law Enforcement

As described above, in response to increased illegal traffic in the CPNWR, border law enforcement has increased. Law enforcement use of the CPNWR is authorized by existing laws, such as The Arizona Desert Wilderness Act of 1990, which specifically states that designation of wilderness lands within the CPNWR will not preclude or otherwise affect continued border operations by border law enforcement. However, interagency and interdepartmental agreements, such as IA and MOU, do exist to minimize impacts to natural resources, such as limiting law enforcement vehicle use to existing designated public and administrative roads and/or trails, except in emergencies involving human life, health, and safety of persons.

Fire Management

General FWS policy is to control all wildfires in the Refuge System, including those within designated wilderness areas unless an approved fire management plan provides for non-suppression under certain circumstances. The CPNWR has no fire management plan, but plans to develop one in the future. Most natural fires on the CPNWR, if discovered, burn out before suppression efforts begin. CPNWR will take immediate action to control all wildfires that do not burn out before suppression crews are mobilized. All control methods in designated wilderness will meet MRA.

Trespass Livestock and Pets

Trespass and feral animals are not permitted and no unconfined domestic animal may enter or roam at large on refuge lands (50 CFR 26.21b). Consequently, CPNWR staff aggressively removes all trespass livestock from the CPNWR and all pets must be leashed and under the control of the owner at all times when on the CPNWR. Methods of livestock removal are determined on a case-by-case basis subject to MRA in wilderness.

SONORAN PRONGHORN
STATUS OF THE SPECIES

A. Description, Legal Status, and Recovery Planning

The Sonoran subspecies of pronghorn (*Antilocapra americana sonoriensis*) was first described by Goldman (1945) and is the smallest of the five subspecies of pronghorn (Nowak and Paradiso 1983). The subspecies was listed throughout its range as endangered on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of October 15, 1966 without critical habitat. Three sub-populations of the Sonoran pronghorn are extant: 1) a U.S. sub-population in southwestern Arizona, 2) a sub-population in the Pinacate Region of northwestern Sonora, and 3) a sub-population on the Gulf of California west and north of Caborca, Sonora. The three sub-

populations are geographically isolated due to barriers such as roads and fences, and in the case of the two Sonora sub-populations, by distance.

The 1982 Sonoran Pronghorn Recovery Plan (U.S. Fish and Wildlife Service 1982) was revised in 1998 (U.S. Fish and Wildlife Service 1998). The recovery criteria presented in the revised plan entailed the establishment of a population of 300 adult pronghorn in one self-sustaining population for a minimum of five years, as well as the establishment of at least one other self-sustaining population in the U.S. to reclassify the subspecies to threatened. Actions identified as necessary to achieve these goals include the following: 1) enhance present sub-populations of pronghorn by providing supplemental forage and/or water; 2) determine habitat needs and protect present range; 3) investigate and address potential barriers to expansion of presently used range and investigate, evaluate, and prioritize present and potential future reintroduction sites within historical range; 4) establish and monitor a new, separate herd(s) to guard against catastrophes decimating the core population, and investigate captive breeding; 5) continue monitoring sub-populations and maintain a protocol for a repeatable and comparable survey technique; and 6) examine additional specimen evidence available to assist in verification of taxonomic status. In 2001 a supplement and amendment to the 1998 Final Revised Sonoran Pronghorn Recovery Plan was prepared (U.S. Fish and Wildlife Service 2001). We concluded that data do not yet exist to support establishing delisting criteria. Tasks necessary to accomplish reclassification to threatened status (as outlined in the 1998 plan) should provide the information necessary to determine if and when delisting will be possible and what the criteria should be.

B. Life History and Habitat

Sonoran pronghorn inhabit one of the hottest and driest portions of the Sonoran Desert. They forage on a large variety of perennial and annual plant species (Hughes and Smith 1990, Hervert *et al.* 1997b, U.S. Fish and Wildlife Service 1998). During drought years, Hughes and Smith (1990) reported cacti were the major dietary component (44 percent). Consumption of cacti, especially chain fruit cholla (*Cylindropuntia fulgida*, Pinkava 1999), provides a source of water during hot, dry conditions (Hervert *et al.* 1997b). Other important plant species in the diet of the pronghorn include pigweed (*Amaranthus palmeri*), ragweed (*Ambrosia* sp.), locoweed (*Astragalus* sp.), brome (*Bromus* sp.), and snakeweed (*Gutierrezia sarothrae*) (U.S. Fish and Wildlife Service1998). Pronghorn will move in response to spatial limitations in forage availability (Hervert *et al.* 1997a). Water intake from forage is not adequate to meet minimum water requirements (Fox *et al.* 2000), hence pronghorn need and readily use both natural and artificial water sources (Morgart *et al.* 2005).

Sonoran pronghorn rut during July-September, and does have been observed with newborn fawns from February through May. Parturition corresponds with annual spring forage abundance. Fawning areas have been documented in the Mohawk Dunes and the bajadas of the Sierra Pinta, Mohawk, Bates, Growler, and Puerto Blanco mountains. Does usually have twins, and fawns suckle for about 2 months. Does gather with fawns, and fawns sometimes form nursery groups (U.S. Fish and Wildlife Service 1998). Sonoran pronghorn form small herds of up to 21 animals (Wright and deVos 1986).

Telemetry locations of 35 Sonoran pronghorn demonstrated that during 1995-2002, pronghorn used creosote/bursage and palo verde/mixed cactus vegetation associations less than expected or equal to availability. Pronghorn use of palo verde/chain fruit cholla associations and desert washes occurred more than expected. However, during the cool and wet winter on 1997-1998, pronghorn were found in creosote/bursage associations more than expected (Hervert *et al.* 2005). In contrast, during 1983-1991, pronghorn used creosote/bursage and palo verde mixed cacti associations more than expected (deVos and Miller 2005). Differences between these study results may be due in part to differences in precipitation and forage patterns between these periods. The earlier period was wetter with greater forage availability in flats and valleys where creosote/bursage associations predominate. In wet winters and early spring, pronghorn are often found in flats and valleys, such as Pinta Sands, the Mohawk Dunes west of the Mohawk Mountains, and the west side of the Aguila Mountains. In late spring and summer, pronghorn then move from the flats and valleys upslope into bajadas and often south or southeast where palo verde associations, chain fruit cholla, and washes are more common. Movements are most likely motivated by the need for thermal cover provided by leguminous trees and water available in succulent chain fruit cholla (Hervert *et al.* 1997b. Home range size of Sonoran pronghorn during 1995-2002 ranged from 16.6 to 1,109 mi^2, with an average of 197 + 257 mi^2 (Hervert *et al.* 2005).

From 1995-2002, adult mortality rates varied from 11-83%. Adults were killed by coyotes, bobcats, mountain lions, capturing efforts, drought, and unknown causes (Bright and Hervert 2005). However, during 1983-1991, apparently a more favorable period for pronghorn during which the population grew significantly, mean annual survival of females and males was 96% + 0.04 and 92% + 0.04 (DeVos and Miller 2005). Disease may affect mortality, but has not been thoroughly investigated (Bright and Hervert 2005). Hervert *et al.* (2000) found that the number of fawns surviving until the first summer rains was significantly correlated to the amount of preceding winter rainfall, and negatively correlated to the number of days without rain between the last winter rain and the first summer rain. Drought may be a major factor in the survival of adults and fawns (Bright and Hervert 2005). Three radio-collared pronghorn died in July and August of 2002 with no obvious cause of death. Given that 2002 was one of the driest years on record, the proximate cause of these mortalities was likely heat stress and/or malnutrition resulting from inadequate forage conditions due to drought.

C. Distribution and Abundance

United States

Historically, the Sonoran pronghorn ranged in the U.S. from approximately the Santa Cruz River in the east, to the Gila Bend and Kofa mountains to the north, and to Imperial Valley, California, to the west (Mearns 1907, Nelson 1925, Monson 1968, Wright and deVos 1986, Paradiso and Nowak 1971; Figure 2). Bright *et al.* (2001) defined the present U.S. range of the Sonoran pronghorn as bordered by Interstate 8 to the north, the International Border to the south, the Copper and Cabeza mountains to the west, and SR 85 to the east (see Figure 3). This area encompasses 2,508 mi^2 (Bright *et al.* 2001).

While Mearns (1907) suggested that pronghorn may have been common in some areas in the late 1800s, evidence suggests that the sub-population declined dramatically in the early 20th century. Sub-population estimates for Arizona, which only began in 1925, have never shown the pronghorn to be abundant (Table 1). Repeatable, systematic surveys were not conducted in Arizona until 1992. Since 1992, Sonoran pronghorn in the United States have been surveyed biennially (Bright *et al.* 1999, 2001) using aerial line transects (Johnson et al. 1991). Sub-population estimates from these transects have been derived using three different estimators (Table 2); currently the sightability model (Samuel and Pollock 1981) is considered the most reliable estimator (Bright *et al.* 1999, 2001). Table 2 presents observation data from transects and compares estimates derived from the three population models from 1992 through 2004.

The sightability model population estimates from 1992 to 2000 showed a 45 percent decrease in sub-population size (Table 2). The estimates indicate a steady decline in sub-population size, with the exception of the 1994 survey. The 1994 estimate may be somewhat inflated due to inconsistencies in survey timing (U.S. Fish and Wildlife Service 1998, Bright *et al.* 2001). High fawn mortality in 1995 and 1996 and the death of half (8 of 16) of the adult, radio-collared pronghorn during the 13 months preceding the December 1996 survey corresponded to five consecutive six-month seasons of below normal precipitation (summer 1994 through summer 1996) throughout most of the Sonoran pronghorn range, which likely contributed, in part, to observed mortality (Bright *et al.* 2001, Hervert *et al.* 1997b).

Mortality of Sonoran pronghorn in 2002 was exceptionally high (Bright and Hervert 2005). At the start of the year, seven radio-collared Sonoran pronghorn were at large in the U.S. sub-population. By December 2002, all but one of these had died. For most, drought stress was considered to be the proximate cause. For those animals that may have succumbed to predation, it was suspected that drought stress was again a factor, by making the animal more vulnerable to predation, due to an emaciated physical condition and being forced into predator habitats by drought. The 2002 drought, lasting from August 2001 to September 2002, was one of the driest on record. As an example, annual rainfall at the OPCNM visitor center was only 2.54 inches in 2002 (Tim Tibbitts, Organ Pipe Cactus National Monument, personal communication, 2002); *average* annual rainfall for the visitor center is 9.2 inches (Brown 1982). The November/December 2002 population survey revealed the U.S. sub-population had declined to the lowest level ever recorded. A total of 18 pronghorn were observed, in three groups (8, 9, and 1). The sightability model resulted in a population estimate of 21 animals, or a 79% decline from 2000. Also, very few fawns survived in 2002 to replace these dying adults.

Although drought was likely the proximate cause of the dramatic decline of the U.S. sub-population in 2002, anthropogenic factors almost certainly contributed to or exacerbated the effects of the drought. Historically, pronghorn likely moved to wetted areas and foraged along the Rio Sonoyta, Sonora, and the Gila and probably Colorado rivers during drought. These areas are no longer accessible to the U.S. population due to fences, Interstate 8, Mexico Highway 2, and other barriers. The rate of decline in the U.S. sub-population from 2000-2002 (79 percent) was also much greater than that observed in either the Sonoran sub-population southeast of Highway 8 (18 percent decline) or the El Pinacate sub-population (26 percent) during the same period (see discussion of Mexican sub-populations in the next section). Observations of forage

availability suggest the El Pinacate sub-population experienced the same severe drought that occurred on the Arizona side (Tim Tibbitts, John Morgart, personal communication, 2003). Yet that sub-population fared much better than its U.S. counterpart. The high level of human activities and disturbance on the U.S. side, particularly in regard to undocumented alien traffic, smugglers, and law enforcement response, as compared to what occurs in the El Pinacate area, is a likely contributing factor in the differing rates of decline observed north and south of the border. See the section entitled "Drought" in the Environmental Baseline and "Cumulative Effects" for further discussion.

The December 2004 survey documented an estimated 58 wild pronghorn in the U.S. population, a substantial increase brought on by favorable conditions since 2002. Based on casual surveys and estimated fawn survival, the population in 2005 was roughly 75 wild pronghorn. The winter of 2006 was very dry until March 11 when up to 2.5 inches of rain fell over most of the eastern range of the pronghorn. With favorable monsoon moisture, the wild population could continue to increase.

Semi-captive breeding facility

As part of a comprehensive emergency recovery program, adult pronghorn were first captured and placed into a semi-captive breeding facility at CPNWR in 2004. There are currently 27 pronghorn in the enclosure, including nine fawns born this year and six yearlings born in the enclosure last year. The objective is to produce 10-25 fawns each year to be released into the U.S. sub-population, and potentially to establish a second U.S. sub-population at Kofa NWR. Four yearling rams are scheduled to be released this year.

Mexico

Historically, Sonoran pronghorn ranged in Sonora from the Arizona border south to Hermosillo and Kino Bay, west to at least the Sierra del Rosario, and east to the area south of the Baboquivari Valley on the Tohono O'odham Nation (Nelson 1925, Carr 1974, Monson 1968). The distribution in Baja California Norte is less clear, but observations by Mearns (1907) indicate they occurred in the Colorado Desert west of the Colorado River, as well. Sonoran pronghorn are currently extant in two sub-populations in Mexico, including: (1) Pinacate sub-population west of Highway 8 near the Pinacate Lava flow; and (2) north and west of Caborca and southeast of Highway 8.

Sub-populations of Sonoran pronghorn in Sonora had not been thoroughly surveyed until the December 2000 surveys (Bright *et al.* 2001), at which time 346 pronghorn were estimated to occur in Sonora. Although the 1993 estimate was approximate, survey results suggested a decline in the sub-populations of 16 percent from 1993 to 2000 (Table 3). The two Mexico sub-populations were resurveyed in December 2002. A grand total (both El Pinacate and southeast of Highway 8) of 214 pronghorn in 32 groups were seen for a tentative population estimate of 280, indicating further decline. Only 19 pronghorn were observed in the Pinacate area for an estimate of 25, which is a decline of 26% from the 2000 estimate. Surveys conducted in December 2004 and February 2005 demonstrated that the population southeast of Highway 8 increased to 625 (439 observed), while the Pinacate population increased to 59 (30 observed). In January 2006, surveys indicated that pronghorn numbers are remaining steady with an estimated

total of 634 (486 observed) individuals (combined for both populations). Nine of these were captured, of which five were fitted with radio-collars and released and four were transferred to the semi-captive breeding facility in the U.S.

Population Viability Analysis

In 1996, a workshop was held in which a population viability analysis (PVA) was conducted for the U.S. sub-population of Sonoran pronghorn (Defenders of Wildlife 1998). A PVA is a structured, systematic, and comprehensive examination of the interacting factors that place a population or species at risk (Gilpin and Soulé 1986). Based on the best estimates of demographic parameters at the time, the likelihood of extinction of Sonoran pronghorn was calculated as one percent in the next 25 years, 9 percent in the next 50 years, and 23 percent in the next 100 years. More severe threats include population fluctuation, periodic decimation during drought (especially of fawns), small present population size, limited habitat preventing expansion to a more secure population size, and expected future inbreeding depression. At populations of less than 100, population viability declined at an increasingly steep rate. To maintain genetic diversity over the long term, a population of at least 500 is desirable (Defenders of Wildlife 1998). The likelihood of extinction increased markedly when fawn mortality exceeded 70 percent. Thus, a 30 percent fawn crop (30 fawns/100 does) each year is necessary to ensure the continuance of the U.S. sub-population. The authors concluded that "this population of the Sonoran pronghorn, the only one in the U.S., is at serious risk of extinction." The authors made these conclusions prior to the severe drought and decline in the species in 2002. On the other hand, Hosack *et al.* (2002) found that some management actions were possible that could improve the chances of population persistence significantly. Actions that would ameliorate the effects of drought or minimize mortality of pronghorn were of particular importance for improving population persistence.

E. Threats

Barriers that Limit Distribution and Movement

Highways, fences, railroads, developed areas, and irrigation canals can completely block access to essential forage or water resources. Highways 2 and 8 in Sonora, and SR 85 between Gila Bend and Lukeville, Arizona support a considerable amount of fast-moving vehicular traffic, and are fenced in some areas, and are likely a substantial barrier to Sonoran pronghorn. Interstate 8, the Wellton-Mohawk Canal, agriculture, a railroad, powerlines, access roads, and associated fences and human disturbance near the Gila River act as barriers for northward movement of pronghorn. De-watering of reaches of the Río Sonoyta River and lower Gila River, and barriers to pronghorn accessing the Gila River, such as Interstate 8 and the Wellton-Mohawk Canal, have caused significant loss of habitat and loss of access to water (Wright and deVos 1986). Agricultural, urban, and commercial development at Sonoyta, Puerto Peñasco, and San Luis, Sonora; in the Mexicali Valley, Baja California Norte; and at Ajo, Yuma, and along the Gila River, Arizona, have further removed habitat and created barriers to movement.

Human-caused Disturbance

A variety of human activities occur throughout the range of the pronghorn that have the potential to disturb pronghorn or its habitat, including livestock grazing in the U.S. and Mexico; military

activities; recreation; poaching and hunting; clearing of desert scrub and planting of buffelgrass (*Pennisetum ciliare*) in Sonora; gold mining southeast of Sonoyta, dewatering and development along the Gila River and Río Sonoyta; increasing undocumented immigration and drug trafficking across the international border and associated law enforcement response; and roads, fences, canals, and other artificial barriers.

Studies of captive pronghorn, other than the Sonoran subspecies, have shown that they are sensitive to disturbance such as human presence and vehicular noise. Human traffic, such as a person walking or running past pronghorn in an enclosed pen, a motorcycle driving past, a truck driving past, a truck blowing its horn while driving past, or a person entering a holding pen, caused an increased heart-rate response in American pronghorn in half-acre holding pens (Workman *et al.* 1992). The highest heart rates occurred in female pronghorn in response to a person entering a holding pen, or a truck driving past while sounding the horn. The lowest heart rates occurred when a motorcycle or truck was driven past their pen. Pronghorn were more sensitive to helicopters, particularly those flying at low levels or hovering, than fixed wing aircraft. Other investigators have shown that heart rate increases in response to auditory or visual disturbance in the absence of overt behavioral changes (Thompson *et al.* 1968, Cherkovich and Tatoyan 1973, Moen *et al.* 1978). Hughes and Smith (1990) found that pronghorn immediately ran 1,310-1,650 feet from a vehicle. Krausman *et al.* (2001, 2004, 2005a) examined effects of military aircraft and ground-based activities on Sonoran pronghorn at the North and South TACs on the BMGR and concluded that military activities, both ground-based and aerial, were associated with some changes in behavior (e.g., from standing to trotting or running, or bedded to standing) but the authors concluded that these changes were not likely to be detrimental to the animals. Sightings of pronghorn were biased towards disturbed habitats on the TACs and other areas of military activities, which also corresponded to areas of favorable ephemeral forage production (Krausman *et al.* 2005a). No conclusions could be drawn about effects of military activities on fawns due to poor fawn productivity during the Krausman *et al.* study. During times of drought, disturbances that cause pronghorns to startle and run would energetically have a more significant effect. Such energetic expenditures, particularly during times of stress, may lead to lower reproductive output and/or survival of individual animals (Geist 1971).

Habitat Disturbance

Livestock grazing has the potential to significantly alter pronghorn habitat and behavior (Leftwich and Simpson 1978, Kindschy *et al.* 1982, Yoakum *et al.* 1996). Overgrazing well into the 19th century by Spaniards and their descendants caused widespread habitat changes throughout much of the Sonoran Desert, particularly in more settled areas such as central Sonora, Mexico (Sheridan 2000). The effects of cattle grazing are largely historical; cattle were removed from OPCNM, CPNWR, and the BMGR in 1979, 1983, and 1986, respectively (U.S. Fish and Wildlife Service 1998, Rutman 1997). In 2004, the BLM closed the Cameron Allotment on the borders of CPNWR and OPCNM, but grazing still occurs in the nearby Childs and Coyote Flat allotments near Ajo. In Sonora, livestock grazing occurs at Pozo Nuevo and at Ejido Puerto Peñasco where cattle typically range widely and often compete directly with pronghorn for forage resources.

Mining occurred historically throughout much of the U.S. range of the pronghorn, but is currently not a significant threat to Sonoran pronghorn in the U.S. During recent pronghorn surveys in Mexico, increasing effects from gold mining activities and large open pit copper mine were noted in habitats used by the sub-population located southeast of Highway 8.

Illegal crossings by undocumented immigrants and drug smugglers in the U.S. range of the pronghorn have increased dramatically in recent years. In 2001, estimates of undocumented migrants traffic reached 1,000 per night on OPCNM alone (Organ Pipe Cactus National Monument 2001), and an estimated 150,000 people entered the monument illegally from Mexico (Milstead and Barns 2002). In fiscal year 2005, the Yuma Sector of the Border patrol apprehended record numbers of illegal immigrants and smugglers, and from October 1, 2005 to May 2006, 96,000 arrests have been made, which is a 13% increase over the same time period in 2005 (Gerstenzang 2006). Illegal border-related activities and Border Patrol response have resulted in widespread habitat degradation and increased human presence in remote areas. Increased enforcement in urban areas has pushed illegal traffic to remote areas, including Sonoran pronghorn habitat in southwestern Arizona.

Fire

The winter and spring of 2004/2005 was very wet, resulting in some of the highest productivity of cool season annual plants in recent memory. As these annual plants dried out, they created fuel for wildfire. In 2005, Mediterranean grass combined with high densities of the native wooly plantain (*Plantago ovata*) and other species created fuels adequate to carry fire. Military training, such as strafing and bombing in the tactical ranges, as well as fires set by illegal immigrants or smugglers, provided the ignition sources. Exact numbers are unknown; however, in 2005 roughly 7,500 acres of pronghorn habitat burned on the CPNWR (personal communication with Curtis McCasland, February 15, 2006) and more than 63,000 acres burned on the BMGR-East during that time. Approximately 29,260 acres of pronghorn habitat were consumed as a result of these fires.

Most Sonoran Desert trees, shrubs, and cacti are poorly adapted to fire (Brown and Minnich 1986, Schwalbe *et al.* 2000, Alford and Brock 2002). If areas burn repeatedly, permanent changes are likely in the flora. Even in the best scenario it is likely to be many decades before trees once again provide thermal cover in wash communities and cholla recover to a point that they are useful forage plants for pronghorn.

Small Population Size and Random Changes in Demographics

At populations of less than 100, population viability declines at an increasingly steep rate. To maintain genetic diversity over the long term, a population of at least 500 is desirable (Defenders of Wildlife 1998). At an estimated 21 in 2002, and roughly 75 wild pronghorn in 2005, the U.S. sub-population is critically endangered and is going through a genetic bottleneck. At an estimated 25 in 2002 and 59 in 2004, the Pinacate sub-population is also well below desired numbers. At 625, the third sub-population (southeast of Highway 8) is marginally large enough to maintain genetic diversity for that one sub-population. Loss of the U.S. sub-population would dramatically reduce our ability to manage or recover this subspecies throughout its range. Populations at low levels may experience random variations in sex ratios, age distributions, and

birth and death rates among individuals, which can cause fluctuations in population size and possibly extinction (Richter-Dyn and Goel 1972). In very sparse populations, males may have trouble finding females, reducing productivity (Ehrlich and Roughgarden 1987). Small populations are also sensitive to variations in natural processes, such as drought and predation (Hecht and Nickerson 1999).

Disease

Sonoran pronghorn can potentially be infected by a variety of viral and bacterial diseases. Blood testing of pronghorn captured during collaring and transplant operations has shown pronghorn exposure to these diseases by increases in antibody titers over time. The diseases relevant to pronghorn can be transmitted indirectly through vectors, such as infected midges or ticks, or directly via aerosolized or direct contact of infected fluids or tissues. Diseases that potentially infect pronghorn are all serious diseases of cattle, which can act as vectors. Cattle within the current range of the pronghorn have not been tested for these diseases.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, state, or private actions in the action area; the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation; and the impact of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform from which to assess the effects of the action now under consultation.

A. Action Area

The "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. Within the U.S. portion of the Sonoran pronghorn's range, pronghorn interact to form one sub-population in which interbreeding may occur. The U.S. sub-population is effectively separated from sub-populations in the El Pinacate Region and on the Gulf Coast of Sonora by Mexico Highways 2 and 8. Activities that may affect animals in any portion of the U.S. range of the pronghorn may affect the size or structure of the U.S. sub-population, or habitat use within the U.S. range. The action area for this biological opinion is defined as the current range of the pronghorn within the U.S. (Figure 3).

Management of the action area is almost entirely by Federal agencies. The BMGR (roughly 1.6 million acres) is managed by Luke Air Force Base and MCAS-Yuma primarily for military training. OPCNM manages 329,000 acres in the southeastern corner of the action area for scenic, ecological, natural, and cultural values. CPNWR lies along the border west of OPCNM and encompasses 860,000 acres. CPNWR is managed to protect, maintain, and restore the diversity of the Sonoran Desert. Most of the CPNWR and OPCNM are designated as wilderness. The BLM manages lands near Ajo for recreation, grazing, and other multiple uses in accordance with the Lower Gila Resource Management Plan.

B. Terrain, Vegetation Communities, and Climate in the Action Area

The action area is characterized by broad alluvial valleys separated by block-faulted mountains and surface volcanics. The Yuma Desert on the western edge of the BMGR is part of a broad valley that includes the Colorado River. Major drainages and mountain ranges run northwest to southeast. Major drainages flow mostly northward to the Gila River, although southern portions of OPCNM and the southern slope of the Agua Dulce Mountains drain south to the Río Sonoyta.

Climate is characterized by extreme aridity, mild winters, and hot summers. Approximately 2.7 inches of precipitation fall annually at Yuma, with slightly more than half of this occurring in the winter months (Brown 1982). Annual precipitation increases from west to east across the BMGR; at Aguajita/Quitobaquito, precipitation is 10.5 inches annually.

The vegetation community of the western portion of the BMGR has been classified as the lower Colorado River Valley subdivision of Sonoran Desert scrub (Brown 1982). It is the largest and most arid subdivision of Sonoran Desert scrub. The Arizona Upland subdivision of Sonoran Desert scrub is found in the Growler, Puerto Blanco, Ajo and Bates mountains, and surrounding bajadas.

C. Status of the Sonoran Pronghorn in the Action Area

Distribution, Abundance, and Life History

The distribution and abundance of the Sonoran pronghorn in the action area is the same as that described above in the Status of the Species for the U.S. sub-population. Life history, including demographics, chronology of breeding and movements, diet, and other factors were also described above for the U.S. population.

Drought

Rowlands (2000) examined trends in precipitation for southwestern Arizona and OPCNM from 1895-1999. For southwestern Arizona, no trend in precipitation was found for the period, but low precipitation occurred around 1895 and during the 1950s. Periods of high precipitation occurred in 1915-1920 and in the 1980s. For OPCNM, there was a slightly increasing trend in monthly and annual precipitation over the period 1895-1999, a strong drought occurred in the 1950s, and a lesser drought occurred in the 1970s. No discernable trend in precipitation in southwestern Arizona or OPCNM was found in the 1990s, which is when the current decline in the U.S. pronghorn population began.

Since Rowland's analysis, we have had one year characterized by above-average rainfall and abundant ephemeral forage (2001) followed by a year with virtually no precipitation or ephemeral forage (2002). Recruitment and survival were high in 2001 and very low in 2002 (Bright and Hervert 2005). Based on the lack of forage and water, and the condition of pronghorn observed, drought is considered the proximate cause of the 79% decline in the pronghorn population from 2000 to 2002. Currently, the western U.S. is in severe drought. Season-to-date basin precipitation (October 1, 2005-May 12, 2006) stands at 29-56% of normal (Miskus 2006). Despite this, since 2002, winter and summer precipitation has been adequate to maintain pronghorn reproduction and fawn survival. Anthropogenic climate change is causing

warming trends in winter and spring, decreased frequency of freezing temperatures, lengthening of the freeze-free season, and increased minimum temperatures in winter (Weiss and Overpeck 2005). Although this alone is likely to cause some changes in vegetation communities and the types of forage available to pronghorn, future trends in precipitation, or whether the drought will continue or worsen, is unclear (Weiss and Overpeck 2005).

Historically, pronghorn populations must have weathered many severe droughts in the Sonoran Desert, including many that were more severe and longer term than what has occurred recently. Given that pronghorn populations survived the droughts of the 1890s, 1950s, 1970s, and others before those, it is unreasonable to solely attribute recent declines in the U.S. pronghorn population to drought. OPCNM (2001) concluded, "If (individual) recent dry years have had an impact on Sonoran pronghorn, it is most likely because in recent decades Sonoran pronghorn have much more limited options for coping with even brief moderate drought. Because of restrictions on their movements and range, and increasing human presence within their range, pronghorn are less able to employ their nomadic strategy in search of relief. It is not that drought itself is an impact, but possibly that drought has *become* an impact, due to other factors confounding the species' normal ecological strategy.

Emergency Recovery Actions

A number of critically important emergency recovery projects have been recently initiated in an attempt to reverse the decline of the U.S. sub-population of the Sonoran pronghorn (Krausman et al. 2005b). These projects are designed to increase availability of green forage and water during dry periods and seasons to offset to some extent the effects of drought and barriers that prevent pronghorn from accessing greenbelts and water, such as the Gila River and Río Sonoyta. Nine emergency water sources, with plans for an additional five, have been constructed in recent years throughout the range of the U.S. sub-population. Five forage enhancement plots, each consisting of a well, pump, pipelines and irrigation lines, are used to irrigate the desert and produce forage for pronghorn. Two additional plots will be installed over the next five years, and it is hoped that a total of 10 plots will eventually be constructed. A semi-captive breeding facility at CPNWR, was first stocked with pronghorn in 2004 and now contains 27 animals. As described above, this facility will be used to augment the current U.S. sub-population, and potentially to establish a second herd at Kofa NWR. These crucial projects, which we hope will pull the U.S. population back from the brink of extinction, have been cooperative efforts among the Service, Arizona Game and Fish Department (AGFD), MCAS-Yuma, Luke Air Force Base, and OPCNM, with volunteer efforts from the Arizona Desert Bighorn Sheep Society, Arizona Antelope Foundation, and the Yuma Rod and Gun Club

D. Past and Ongoing Non-Federal Actions in the Action Area

The Status of the Species section describes a variety of human activities that have affected the Sonoran pronghorn since initiation of livestock grazing over 300 years ago (Officer 1993). Most non-Federal activities that have affected the pronghorn are historical in nature, and pronghorn have been all but extirpated from private, state, and Tribal lands.

E. Past and Ongoing Federal Actions in the Action Area

Because of the extent of Federal lands in the action area, most activities that currently, or have recently, affected the U.S. sub-population or their habitat are Federal actions. The primary Federal agencies involved in activities in the action area include the MCAS-Yuma, Luke Air Force Base, Fish and Wildlife Service, BLM, Organ Pipe Cactus NM, and Border Patrol. In the following discussion, we have categorized Federal actions affecting the pronghorn as: 1) those actions that have not yet undergone section 7 consultation (although in some cases consultation has been completed on components of the Federal activity), and 2) Federal actions that have undergone consultation.

Federal Actions For Which Consultation Has Not Been Completed

1) Tucson Sector of the Border Patrol

We have been in informal consultation with the Tucson Sector Border Patrol regarding development of a biological assessment for some time (consultation number 02-21-99-I-0138). This consultation will encompass all field activities conducted by the Tucson Sector under their program to detect, deter, and apprehend undocumented immigrants and drug traffickers. Activities within the Ajo Station of the Tucson Sector have the greatest potential to adversely affect pronghorn; although currently that Station is being operated out of the Yuma Sector. Adverse effects may result from patrol road activities, drag road activities, off-road operations, aircraft overflights, and the use and maintenance of sensors. About 180 miles of illegal roads have been created in wilderness areas of CPNWR in the last four years (Segee and Neeley 2006). These routes have likely been created both by Border Patrol and smugglers, and all are probably used by Border Patrol. Furthermore, the potential for disturbance to pronghorn due to human presence may increase in areas where agents live on site (i.e., Operation Grip). Border Patrol activities can be beneficial as well, in that they deter illegal border crossings, foot traffic, and off-road vehicles in pronghorn habitat associated with undocumented aliens and smuggling. At the same time, effectiveness of Border Patrol operations elsewhere along the U.S/Mexico border have driven illegal activities into remote areas, such as CPNWR.

2) Smuggler/Drug Interdiction

We are aware of U.S. Customs, Drug Enforcement Authority, and Arizona Army National Guard smuggler or drug interdiction activities in pronghorn habitat, including vehicle and helicopter activities. However, none of these agencies have provided information to us about the extent or types of activities they conduct, and no consultation has occurred on these activities. Impacts are probably similar in scope to those described for the Tucson Sector activities.

3) BLM Off-Road Vehicle Use Area

We are aware of an off-road vehicle (ORV) use area located at the northern end of Ajo on BLM land, located near the CPNWR, likely adjacent to suitable pronghorn habitat. The BLM has not authorized the use of this ORV area but plans to in the updated Resource Management Plan (RMP) they are developing for BLM lands in the vicinity. They will request formal section 7

consultation on the updated RMP. To date, BLM has not provided us with information about the extent and type of use of the ORV area or its possible effects to pronghorn.

Federal Actions Addressed in Section 7 Consultations

As part of our comprehensive discussion of all past and present actions affecting pronghorn within the action area, we describe below all biological opinions issued to date on actions that may affect the pronghorn.

Several opinions addressed projects with minor effects to the pronghorn (capture and collaring of pronghorn for research purposes, consultation numbers 02-21-83-F-0026 and 02-21-88-F-0006; installation of a water source in the Mohawk Valley for pronghorn, consultation number 02-21-88-F-0081; a change in aircraft type from the F-15A/B to the F-15E on BMGR-East [F-15E Beddown Project], consultation number 02-21-89-F-0008; and the following projects at OPCNM: widen North Puerto Blanco Road project, consultation number 02-21-01-F-0109; roadway and drainage improvements to SR 85, consultation 02-21-01-F-0546; vehicle barrier, consultation number 02-21-02-F-237; and improvement, maintenance, and use of the West Boundary Route, consultation number 02-21-05-M-0100 (this opinion has not yet been finalized). Incidental take was anticipated only for the Beddown Project in the form of harassment as a result of aircraft overflights. This project was later incorporated into the biological opinion on Luke Air Force Base's activities on the BMGR, discussed below. All of these formal consultations can be viewed on our website at http://www.fws.gov/arizonaes/Biological.htm.

Seven biological opinions evaluated major projects with greater effects to pronghorn:

Border Patrol Activities in the Yuma Sector, Wellton Station, Yuma, Arizona

This biological opinion (consultation number 02-21-96-F-0334), issued September 5, 2000, addressed all Border Patrol activities along the United States/Mexico border in Yuma County from the Colorado River to about the area of Pinta Sands at the south end of the Sierra Pinta Mountains. The Yuma Sector requested reinitiation of consultation; we delivered a draft biological opinion in 2004. We are awaiting comments from the Border Patrol and hope to conclude reinitiation in 2006. Border Patrol activities within the Yuma Sector/Wellton Station include helicopter and ground patrols; drag road preparation and assessment of road maintenance; remote sensor installation and maintenance; apprehensions and rescues; and assistance to other sectors and agencies. Disturbance to pronghorn was anticipated as a result of on-the-ground Border Patrol operations, and direct injury or mortality of pronghorn as a result of collision with Border Patrol vehicles or by low-level helicopter flights abruptly approaching and startling pronghorn, which may result in injury or energetic stress, particularly during drought. Pronghorn may also be adversely affected by noise and visual impacts of helicopter overflights. To reduce adverse effects on pronghorn, the Border Patrol agreed to implement a number of conservation measures. We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. We anticipated take in the form of harassment that is likely to injure up to one pronghorn in 10 years. The following reasonable and prudent measures were provided: 1) minimize injury of pronghorn; 2) monitor and study reactions of pronghorn

on BMGR to Border Patrol activities; and 3) provide a means to determine the level of incidental take that results from Border Patrol activities. Several conservation recommendations were also provided. We are not aware of any incidental take attributable to Yuma Sector activities.

Department of Homeland Security Permanent Vehicle Barrier

This draft biological opinion (consultation number 22410-2006-F-0113), issued June 28, 2006, addressed the CBP/OBP's installation of a permanent vehicle barrier (as well as improvements to access and border roads and associated maintenance and patrol activities) along the border from the western end of the Organ Pipe Cactus NM barrier to Avenue C just east of San Luis, Arizona. Effects to pronghorn included 1) disturbance of a narrow swath of habitat along the border, 2) presence of construction crews and vehicles which may disturb or preclude use of the area by pronghorn, 3) presence of maintenance and patrol vehicles and crews along the barrier access road, and 4) dramatic reduction or elimination of illegal drive-throughs and law enforcement response, with much reduced route proliferation and habitat damage from off-highway vehicles. We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. No incidental take of pronghorn was anticipated.

BLM's Lower Gila South Management Area

Three biological opinions address BLM's Lower Gila South Management Area. The Lower Gila South Resource Management Plan-Goldwater Amendment (consultation number 02-21-90-F-0042), proposed specific and general management guidance for non-military activities on the BMGR. The non-jeopardy biological opinion, issued April 25, 1990, was programmatic, requiring BLM to consult when site-specific projects are proposed. No incidental take was anticipated. The Lower Gila South Habitat Management Plan (HMP) (consultation number 02-21-89-F-0213) provided management guidance for both specific and general actions in southwestern Arizona. Four actions were addressed in the HMP, including an exchange of 640 acres near Ajo, rehabilitation work on two catchments, and assessment of livestock removal from pronghorn habitat. Exchange of land out of public ownership may facilitate development or other uses that would preclude use by pronghorn. The non-jeopardy opinion was issued on May 15, 1990. The biological opinion for the Lower Gila South Resource Management Plan and Amendment (consultation number 02-21-85-F-0069) addressed programmatic management of lands in southwestern Arizona, including livestock grazing, wilderness, cultural resources, fire, minerals and energy, recreation, wildlife management, wood cutting, Areas of Critical Environmental Concern, and other land uses. The non-jeopardy biological opinion was issued on March 27, 1998; no incidental take was anticipated. In regard to management on the BMGR, these three opinions have been replaced by the opinion on the BMGR's Integrated Natural Resources Management Plan (INRMP) (see below). The Air Force and MCAS-Yuma have assumed BLM's management responsibilities on the BMGR.

BLM grazing allotments in the vicinity of Ajo, Arizona

The original biological opinion (consultation number 02-21-94-F-0192), issued December 3, 1997, addressed effects to pronghorn resulting from issuance of grazing permits on five allotments, four of which were located near Ajo and Why (Cameron, Childs, Coyote Flat, and

Why allotments); and the fifth near Sentinel (Sentinel allotment). All but portions of allotments east of Highway 85 were considered to be within the current distribution of the Sonoran pronghorn. Reinitiations resulted in revised biological opinions dated November 16, 2001, September 30, 2002, June 21, 2004, and March 3, 2005. Under the current proposed action, the Cameron Allotment is closed, the Sentinel Allotment has been in non-use for several years, the Coyote Flat and Why allotments were combined into one (Coyote Flat Allotment), and the Childs Allotment remains relatively unchanged in terms of management. Effects of livestock grazing activities included reduced forage availability for pronghorn, human disturbance due to livestock management, barriers to movement caused by pasture and allotment fences, and potential for disease transfer from cattle to pronghorn. The March 3, 2005 opinion concluded that the proposed action was not likely to jeopardize the continued existence of the pronghorn. No incidental take was anticipated, and none is known to have occurred.

Organ Pipe Cactus National Monument General Management Plan

The original biological opinion (consultation number 02-21-89-F-0078), issued June 26, 1997, addressed implementation of OPCNM's General Management Plan (GMP). This opinion was reinitiated four times, resulting in revised biological opinions dated November 16, 2001, April 7, 2003, and March 10 and August 23, 2005. GMP plan elements included: 1) continuing travel and commerce on SR 85 while enhancing resource protection, 2) seeking designation of OPCNM as the Sonoran Desert National Park, 3) establishment of partnerships, 4) increased wilderness and an interagency wilderness and backcountry management plan, 5) changes in trails, facilities, and primitive camping, and 6) implementation of a Cultural Resources Management Plan. Included were a number of conservation measures to minimize impacts to pronghorn. Effects of the action included human disturbance to pronghorn and habitat due to recreation and management activities. We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. In the latest versions of the opinion, no incidental take of pronghorn was anticipated. No incidental take is known to have occurred.

Marine Corps Air Station-Yuma in the Arizona Portion of the Yuma Training Range Complex

The original biological opinion (consultation number 02-21-95-F-0114), was issued on April 17, 1996. That opinion was reinitiated, and revised opinions were issued November 16, 2001 and August 6, 2003. These opinions addressed all proposed and authorized actions on the BMGR by MCAS-Yuma, including ongoing and proposed changes to military flights over CPNWR and the BMGR, operation of various training facilities such as landing strips, a rifle range, targets, a parachute drop zone, a transmitter/telemetry system, ground support areas, and Weapons Tactics Instructor courses, conducted twice a year (March-April and October-November) that involve overflights, ground-based activities, and deliverance of ordnance at targets in BMGR-East. Ground-based activities, such as those of troops and vehicles at ground-support areas were determined to adversely affect pronghorn habitat use. In areas where helicopters fly particularly low and create noise and visual stimuli, disturbance of pronghorn was anticipated. Ordnance delivery at North and South TACs could disturb pronghorn, and ordnance, live fire, and shrapnel could potentially strike and kill or injure a pronghorn. MCAS-Yuma proposed measures to reduce the direct and indirect impacts of the proposed action, including measures to reduce or eliminate take of Sonoran pronghorn and to minimize destruction and degradation of habitat.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. In the 2003 version of the BO, no incidental take of pronghorn was anticipated and none is known to have occurred.

Luke Air Force Base Use of Ground-Surface and Airspace for Military Training on the BMGR

The original biological opinion (consultation number 02-21-96-F-0094), issued August 27, 1997, addressed military use of the airspace above and the ground space on BMGR-East and CPNWR by Luke Air Force Base. Military activities within the area of overlap with the CPNWR were limited to use of airspace and operation of four Air Combat Maneuvering Instrumentation sites. Military activities occurring within BMGR-East included: airspace use, four manned air-to-ground ranges, three tactical air-to-ground target areas, four auxiliary airfields, Stoval Airfield, and explosive ordnance disposal/burn areas. Primary potential effects of the action included habitat loss due to ground-based activities, harassment and possible mortality of pronghorn at target areas, and disturbance of pronghorn due to military overflights. We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. This opinion was reinitiated in 2001 and 2003, resulting in revised opinions dated November 16, 2001 and August 6, 2003. In the latest (2003) opinion, no incidental take was anticipated. We are not aware of any take of pronghorn confirmed attributable to Luke Air Force Base use of the ground-surface and airspace on the BMGR. A pronghorn found dead near a target may have been strafed, but it may also have died from other causes (see "Effects of the Proposed Action" in the 2003 opinion for a full discussion of this incident).

During the development of these opinions, Luke Air Force Base made substantial commitments to minimize the effects of their activities on the Sonoran pronghorn, and additionally committed to implementing a variety of recovery projects recommended by the Sonoran Pronghorn Recovery Team.

Western Army National Guard Aviation Training Site Expansion Project

The non-jeopardy biological opinion for WAATS (consultation number 02-21-92-F-0227) was issued on September 19, 1997; however, Sonoran pronghorn was not addressed in formal consultation until reinitiations and revised opinions dated November 16, 2001 and August 6, 2003. The purpose of WAATS is to provide a highly specialized environment to train ARNG personnel in directed individual aviator qualification training in attack helicopters. The WAATS expansion project included: 1) expansion of the existing Tactical Flight Training Area, which includes establishing four Level III touchdown sites, 2) development of the Master Construction Plan at the Silver Bell Army Heliport, and 3) establishment of a helicopter aerial gunnery range for use by the ARNG on East TAC of the BMGR. All activities that are part of the proposed action occur outside the current range of the pronghorn, with the exception of training at North TAC. Training at North TAC only occurs when East TAC is closed for annual maintenance and EOD clearances (4-6 weeks each year). Effects to pronghorn at North TAC are minimized by monitoring protocols established by Luke Air Force Base. Training at East TAC could preclude recovery of historical habitat if the many other barriers that prevent pronghorn use of East TAC were removed. The November 16, 2001 and August 6, 2003 opinions found that the proposed action was not likely to jeopardize the continued existence of the pronghorn. No incidental take

was anticipated and none is known to have occurred as a result of the proposed action. ARNG included the following conservation measures as part of their proposed action: 1) they proposed to study the effects of low-level helicopter flights on a surrogate pronghorn population at Camp Navajo, and 2) they committed to funding up to five percent of emergency recovery actions on the BMGR.

BMGR Integrated Natural Resources Management Plan

The non-jeopardy opinion for this action was issued on August 26, 2005. The Military Lands Withdrawal Act (MLWA) of 1999 required that the Secretaries of the Air Force, Navy, and Interior jointly prepare an INRMP for the BMGR, the purpose of which was to provide for the "proper management and protection of the natural and cultural resources of [the range], and for sustainable use by the public of such resources to the extent consistent with the military purposes [of the BMGR]." The proposed action was comprehensive land management, including public use restrictions, authorizations, and permitting on portions of the BMGR regarding camping, vehicle use, shooting, entry into mines, firewood collection and use, rockhounding, and other activities; natural resources monitoring, surveys, and research; habitat restoration; wildlife water developments; development of a wildfire management plan; law enforcement; limitations on the locations of future utility projects and the Yuma Area Service Highway; control of trespass livestock; and designation of special natural/interest areas, while allowing other designations to expire. The proposed action included many land use prescriptions that would improve the baseline for the pronghorn. No incidental take was anticipated, and none is known to have occurred from the proposed action.

F. Summary of Activities Affecting Sonoran Pronghorn in the Action Area

Historically, livestock grazing, hunting or poaching, and development along the Gila River and Río Sonoyta were all probably important factors in the well-documented Sonoran pronghorn range reduction and apparent population decline that occurred early in the 20th century. Historical accounts and population estimates suggest pronghorn were never abundant in the 20th century, but recently, the estimated size of the wild population in the action area declined from 179 (1992) to 21 (December 2002) and roughly 75 (2005). At 21 and 75, genetic diversity could erode, and the sub-population is in imminent danger of extirpation due to human-caused impacts, or natural processes, such as predation or continued drought. Although the proximate cause of the decline during 2002 was drought, human activities limit habitat use options by pronghorn and increase the effects of drought on the sub-population. The U.S. pronghorn sub-population is isolated from other sub-populations in Sonora by a highway and the U.S./Mexico boundary fence, and access to the greenbelts of the Gila River and Río Sonoyta, which likely were important sources of water and forage during drought periods, has been severed.

Within its remaining range, the pronghorn is subjected to a variety of human activities that disturb the pronghorn and its habitat, including military training, increasing recreational activities, grazing, increasing presence of undocumented immigrants and smugglers, and in response, increased law enforcement activities. MCAS-Yuma (2001) quantified the extent of the current pronghorn range that is affected by various activities and found the following: recreation covers 69.6 percent of the range, military training on North and South TACs covers 9.8 percent,

active air-to-air firing range covers 5.8 percent, proposed EOD five-year clearance areas at North and South TACs and Manned Range 1 cover 1.0 percent, and MCAS-Yuma proposed ground support areas and zones cover 0.29 percent. OPCNM (2001) identified 165 human activities in the range of the pronghorn, of which 112 were adverse, 27 were beneficial, 26 had both adverse and beneficial effects, and four had unknown effects. OPCNM (2001) concluded that in regard to the pronghorn, "while many projects have negligible impacts on their own, the sheer number of these actions is likely to have major adverse impacts in aggregate."

Although major obstacles to recovery remain, since 2002, numerous crucial recovery actions have been implemented in the U.S. range of the species, including nine emergency waters and five forage enhancement plots, with additional waters and forage plots planned. The projects tend to offset the effects of drought and barriers to prevent movement of pronghorn to greenbelts such as the Gila River and Río Sonoyta. A semi-captive breeding enclosure, built on CPNWR, currently holds 27 pronghorn. This facility will provide pronghorn to augment the existing sub-population and hopefully to establish a second U.S. sub-population at Kofa NWR.

The current range of the pronghorn in the U.S. is almost entirely comprised of lands under Federal jurisdiction; thus authorized activities that currently affect the pronghorn in the action area are almost all Federal actions. However, illegal, unauthorized foot traffic and off-road vehicle activity, but also Federal law enforcement response have been and continue to be significant threats to the pronghorn and its habitat. Prior to November 2001, in seven of 12 biological opinions issued by FWS that analyzed impacts to the pronghorn, we anticipated that take would occur. In total, we anticipated take of five pronghorn in the form of direct mortality every 10-15 years, and an undetermined amount of take in the form of harassment. Given the small and declining population of pronghorn in the U.S. at the time the opinions were written, take at the levels anticipated in the biological opinions would constitute a substantial impact to the population.

Changes made in proposed actions and reinitiated biological opinions from 2001 to the present, plus the findings in other recent opinions, reduced the amount or extent of incidental take anticipated to occur from Federal actions. Significantly, we have been successful working with action agencies to modify proposed actions and to include significant conservation measures that reduce adverse effects to the pronghorn and its habitat. The only current opinion that anticipates incidental take is the Yuma Sector opinion, in which we anticipated take in the form of harassment that is likely to injure up to one pronghorn in 10 years. With the exception of likely capture-related deaths during telemetry studies (which were addressed in 10(a)(1)(A) recovery permits), we are unaware of any confirmed incidental take resulting from the Federal actions described here (although a pronghorn may have been strafed near one of the targets on BMGR-East – see above).

We believe the aggregate effects of limitations or barriers to movement of pronghorn and continuing stressors, including habitat degradation and disturbance within the pronghorn's current range resulting from a myriad of human activities, exacerbated by periodic dry seasons or years, are responsible for the present precarious status of the Sonoran pronghorn in the action area. However, collaborative, multi-agency and multi-party efforts to develop forage enhancement plots and emergency waters, combined with the success of the semi-captive

breeding facility, plus planned future recovery actions, including establishment of a second U.S. sub-population, provide hope that recovery of the Sonoran pronghorn in the U.S. is achievable.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Implementation of the wildlife and habitat management, wilderness stewardship, and visitor service management elements of the proposed CCP may result in degradation of pronghorn habitat and/or disturbance to pronghorn. Adverse effects to pronghorn could result from vehicular and foot traffic associated with recreational and management/monitoring activities; overflights for wildlife monitoring and management of waters; and management of wildlife waters (if water-borne diseases are transmitted through wildlife waters) described in sections 2.1, 2.5, and part of 2.6 of the CCP. These activities may disturb pronghorn and/or degrade their habitat in a number of ways, such as from associated noise and light pollution; disturbance of soils; and crushing, destruction, or removal of vegetation that may provide forage and cover to pronghorn. Additionally, though it has not been documented for Sonoran pronghorn, there is a potential for pronghorn to be killed or injured through collision with vehicles.

Though the CCP would authorize some activities that may be detrimental to pronghorn, restrictions, prohibitions, and provisions included in the CCP should generally reduce disturbance to pronghorn and degradation of their habitat. Additionally, certain wildlife and habitat management activities included in the CCP will greatly aid in the recovery and conservation of pronghorn. Overall, implementation of the CCP will be beneficial to pronghorn on the CPNWR and throughout their range.

The pronghorn is sensitive to human presence. Krausman *et al.* (2001) reported that Sonoran pronghorn reacted to ground disturbances (vehicles or people on foot) with a change in behavior 37 percent of the time, resulting in the animals running or trotting away 2.6 percent of the time. The effects of disturbance from vehicular use of roads on Sonoran pronghorn were a more significant impact than disturbance from aircraft (helicopter, jet, and fixed wing) (Krausman *et al.* 2001). Wright and deVos (1986) noted that Sonoran pronghorn exhibit "a heightened response to human traffic" as compared to other subspecies of pronghorn. They noted that "once aware of an observer, Sonoran pronghorn are quick to leave the area. One herd was observed 1.5 hours later 11 miles north of the initial observation in October 1984. Other pronghorn have run until out of the observer's sight when disturbed." Hughes and Smith (1990) noted that on all but one occasion, pronghorn ran from the observer's vehicle and continued to run until they were out of sight. They also found that pronghorn immediately ran 1,310-1,650 feet from a vehicle, and that military low-level flights (<500 feet above ground level) over three pronghorn caused them to move about 330 feet from their original location. Krausman *et al.* (2001) documented 149

direct overflights and 263 other overflights (in which the aircraft passed ≥328 feet to the side of the animal). Pronghorn changed their behavior (e.g., from standing to trotting or running, or bedded to standing) 39 and 35 percent of the time during direct and other overflights, respectively.

Studies of captive pronghorn, other than the Sonoran subspecies, have also shown that they are sensitive to disturbance such as human presence and vehicular noise. Human traffic, such as a person walking or running past pronghorn in an enclosed pen, a motorcycle driving past, a truck driving past, a truck blowing its horn while driving past, or a person entering a holding pen, caused an increased heart-rate response in American pronghorn in half-acre holding pens (Workman *et al.* 1992). The highest heart rates occurred in female pronghorn in response to a person entering a holding pen, or a truck driving past while sounding the horn. The lowest heart rates occurred when a motorcycle or truck was driven past their pen. Other investigators have shown that heart rate increases in response to auditory or visual disturbance in the absence of overt behavioral changes (Thompson *et al.* 1968, Cherkovich and Tatoyan 1973, Moen *et al.* 1978).

Disturbance and flight of ungulates are known to result in a variety of physiological effects that are adverse, including elevated metabolism, lowered body weight, reduced fetus survival, and withdrawal from suitable habitat (Geist 1971, Harlow *et al.* 1987). Frequent disturbance imposes a burden on the energy and nutrient supply of animals (Geist 1971), which may be exacerbated in harsh environments such as those occupied by Sonoran pronghorn. Human presence may cause Sonoran pronghorn to move from an area, thereby denying pronghorn access to that specific site for what may be crucial ecological functions (e.g. foraging, bedding, seeking thermal shelter, seeking mates, seeking fawning sites, seeking areas of relative safety from predators). Causing pronghorn to move also increases their physiological demands by expending calories and metabolic water. These may be critical stressors in seasonal hot-dry periods and in extended periods of low forage availability. Disturbance may also lead to mortality. Causing a pronghorn to be alarmed or agitated, or to flee from a disturbance, may also make it vulnerable to predator attack. This is especially true for fawns and females during the fawning season. Krausman *et al.* (2001) found that fawns and their mothers were more sensitive to human disturbance than other life stages of Sonoran pronghorn.

Recreation is recognized as having significant environmental impacts on wildlife (Knight and Gutzwiller 1995). Non-motorized human recreation activities, such as hiking, have the ability to disrupt wildlife in many ways, particularly by displacing animals (Knight and Gutzwiller 1995). McArthur *et al.* (1982) reported elevated heart rates and flight among mountain sheep approached by humans. Mountain sheep reactions to hikers were greater than reactions to road traffic, helicopters, or fixed wing aircraft. Peak levels of hiking and skiing displaced chamois from nutritionally important habitats for prolonged periods (Hamr 1988). Orienteering activities in Denmark displaced roe and red deer from their home ranges; however, the animals eventually returned to these areas after disturbances ceased (Jeppesen 1987a, 1987b). Cassier *et al.* (1992) found that elk in Yellowstone National Park moved an average of 1.1 mile to avoid cross country skiers, often moving to another drainage.

Wildlife and Habitat Management

Implementing the "Wildlife and Habitat Management" element of the CCP may result in disturbance to pronghorn and their habitat. Vehicles associated with implementing this element could also collide with pronghorn causing injury and/or death. However, because pronghorn are relatively rare and because we are not aware of any such collisions in the U.S., or along unpaved routes anywhere within the range of the Sonoran pronghorn, we believe the chances of such collisions are low. Potential disturbance to pronghorn as well as chance of collision associated with this element should be limited because management and monitoring activities will be conducted when pronghorn are absent from the activity area or if pronghorn are present, all activities would be suspended until pronghorn have moved away from the activity area (Curtis McCasland, CPNWR, personal communication, June 30, 2006). Furthermore, because one of the primary objectives of the CPNWR is to protect and recover Sonoran pronghorn, when pronghorn are encountered by CPNWR staff, staff typically suspend their activity as noted above and record the event (i.e., make note of the pronghorn's behavior, general habitat characteristics of the area being used by pronghorn, etc.)(Curtis McCasland, CPNWR, personal communication, June 30, 2006). Overall, implementation of this element will result in significant net benefits to pronghorn as described below.

Waters and Forage Enhancement Plots

Continuing to provide perennial water sources and enhanced forage areas should benefit the pronghorn population by increasing recruitment (the survival of fawns to breeding age) during periods of drought (WFEIS 2006). Fox *et al.* (2000) conducted a study of water and nutrient content of forage in Sonoran pronghorn habitat in Arizona and concluded that water content of forage on the eastern third of the CPNWR was insufficient to meet pronghorn water requirements during drought. Given that fawns, pregnant does, and lactating does have greater water and energy requirements than the species on average (Krausman 2004), the need for perennial water and an enhanced forage base to maintain population recruitment is apparent. A recent study suggested that selective foraging on chainfruit cholla cactus by pronghorn during droughts (due to its high water content) may reduce recruitment in the population as this plant has little nutritional value, and, while it may keep pronghorn alive longer in drought, it is probably not sufficient for growing fawns (Bright and Hervert 2005). Forage enhancements should provide nutritious forage with high water content and aid in fawn growth and survival.

Conducting a CPNWR-wide survey for sites appropriate for additional developed pronghorn waters and forage enhancement plots and developing additional waters and plots at the appropriate sites will beneficially affect pronghorn if water and forage are limiting factors on the U.S. Sonoran pronghorn population, as is suggested by Fox *et al.* (2001). Though unlikely[5], developed waters could adversely affect pronghorn if they harbor and spread harmful pathogens to pronghorn. Monitoring of waters, as recommended by Broyles (1995) and proposed by the CCP, could benefit pronghorn if harmful pathogens are identified and eliminated. Developed waters could also adversely affect pronghorn if predators key-in on the waters and predate upon pronghorn using the waters or if the waters increase the carrying capacity of predators in the area. The CPNWR, however, has no evidence that Sonoran pronghorn have been predated upon at the developed waters and it is unknown as to whether the waters increase the carrying capacity

[5] No pathogens harmful to native wildlife have been detected at 12 developed waters at the Kofa NWR after being monitored monthly for more than three years (Krausman 2004).

of predators (Curtis McCasland, FWS, personal communication, July 24, 2006). Though it is possible that the waters may increase the risk of predation on pronghorn, overall, the net effects of the developed waters on pronghorn are likely beneficial, particularly during periods of drought.

Seasonal Closures

Closing public access to approximately the eastern three-quarters of the CPNWR (roughly from five miles east of Tule Well to the eastern boundary) during the fawning season (generally March 15 to July 15 as described in the "Description of the Proposed Action"), as has occurred since 2002, until it has been determined that the U.S. subpopulation of Sonoran pronghorn has stabilized (i.e., either it has met the criteria for downlisting described in the "Status of the Species" and it has been downlisted or the environmental documents are being processed to finalize the downlisting, or the pronghorn population has remained stable with over 200 individuals for several years; Curtis McCasland, CPNWR, personal communication, June 30, 2006) should significantly benefit pronghorn (through reducing the chances of interactions between recreational users and pronghorn).

Predator Management

Conducting a study of radio-collared coyotes focused on their use of CPNWR developed waters and movement in relation to Sonoran pronghorn as well as selectively removing coyotes when the wild pronghorn population is less than 100 and winter and spring precipitation is less than 50 percent of average should benefit pronghorn. Predation can be an important limiting factor on populations that are well below carrying capacity (Ballard *et al.* 2001 as cited in the WFEIS), as is the case for Sonoran pronghorn on the CPNWR. Coyote monitoring operations, particularly if done using a vehicle or aircraft, could disturb pronghorn and degrade their habitat as described above and below. However, the proposed study would increase the likelihood of effective coyote control through increased knowledge of coyote movements and den locations (Krausman 2004), which overall, should result in a direct, long-term positive effect on the U.S. Sonoran pronghorn population.

Other Wildlife Surveys, Management, and Research

Most surveys should have no to little effect (pupfish, Peirson's milkvetch, lesser long-nosed bat, etc.) on pronghorn. Some surveys (bighorn sheep aerial surveys) and management activities associated with other wildlife (e.g., hauling water to wildlife waters, removal of exotic species and trespass livestock) however, particularly if they are conducted within pronghorn habitat, could disturb pronghorn and degrade their habitat (i.e., from aircraft, vehicular use, human presence, etc.). While bighorn sheep aerial surveys have the potential to disturb pronghorn when helicopters are transiting between mountain ranges, effects should be minimal because most of the flight time is in the mountains, typically away from pronghorn habitat.

Some monitoring and management activities for other species will result in net beneficial effects to pronghorn. For example, monitoring and controlling exotic/non-native plant species and removing trespass livestock would benefit pronghorn and pronghorn habitat (i.e., maintain and improve forage conditions; reduce or prevent introduction/spread non-native plants, spread of disease to wildlife, and competition between livestock and pronghorn for forages resources; etc.)

Pronghorn will also generally benefit from continued biological research on the CPNWR. For example implementing the research goals of the Sonoran pronghorn recovery effort may lead to improved management of pronghorn and their habitat. Facilitating and supporting research on exotic and invasive species may ultimately result in improved pronghorn habitat conditions.

Wilderness Stewardship

Implementing the "Wilderness Stewardship" element of the CCP may result in disturbance to pronghorn and their habitat. Vehicles associated with implementing this element could also collide with pronghorn causing injury and/or death. However, for the same reasons stated above, we believe the chances of such collisions are low. Additionally, as described above, potential impacts to pronghorn associated with this element should be limited because "Wilderness Stewardship" activities will primarily be conducted when pronghorn are absent from the activity area or if pronghorn are present, all activity will be suspended until pronghorn have moved away from the activity area. Overall, implementation of this element will benefit pronghorn as described below.

Removal of hazards

Some wilderness stewardship activities (e.g., removing abandoned vehicles via tow-truck and/or helicopter, removing tow-darts, removing unexploded ordnance, etc.) may temporarily disturb pronghorn (from presence of people and vehicles) or degrade their habitat (vehicular use of vehicle routes as further discussed below). However, in general these activities will beneficially affect pronghorn and their habitat, reducing their exposure to potential hazards.

Administrative Trail Restrictions

Closing 20 miles of administrative trails to management vehicular use will benefit pronghorn and their habitat by reducing their exposure to vehicles. The trails will, however, remain available to border law enforcement (i.e., Office of the Border Patrol, OBP) use under the provisions of the Arizona Desert Wilderness Act of 1990 and the MOU, as described in the "Description of the Proposed Action" and below. CPNWR will continue, however, to request OBP to consult with us on any of their actions (that may affect listed species), either proposed or current, that are not covered by existing Section 7 consultations.

Impact monitoring

Monitoring impacts to wilderness from illegal immigrants/smugglers, law enforcement, and visitor use, as well as monitoring campsites, will benefit pronghorn if it results in identifying areas where detrimental impacts to pronghorn habitat are occurring and effective management responses are developed and implemented.

Childs Mountain Communications Site

Continuing to allow currently permitted uses of the Childs Mountain communications site and renewing permits as deemed necessary for human safety and efficient law enforcement may impact pronghorn somewhat. The communications site is outside of pronghorn habitat; however, because the site's access road passes through some potential pronghorn habitat for a short distance, vehicles using the access road could disturb pronghorn and degrade their habitat. These impacts should be minimal, however, as pronghorn infrequently use the area (likely due to its

proximity to developed areas including an unauthorized OHV area on BLM land at the north end of Ajo).

Border Law Enforcement

In response to increased illegal traffic on the CPNWR, border law enforcement (particularly OBP) has increased. Both illegal traffic and law enforcement activities can adversely affect pronghorn and their habitat as described in the "Status of the Species", "Environmental Baseline", and "Cumulative Effects", as well as other documents and biological opinions (i.e., the draft biological opinion, consultation number 22410-2006-F-0113, issued June 28, 2006 for the CBP/OBP Permanent Vehicle Barrier Project, and the biological opinion, consultation number 02-21-96-F-0334, issued September 5, 2000 and draft biological opinion issued in 2004 regarding Border Patrol Activities in the Yuma Sector, Wellton Station). As described in the "Environmental Baseline", the OBP has not completed consultation on many of their activities occurring within pronghorn habitat. CPNWR does not have authority over OBP's activities within the CPNWR; however, interagency agreements exist, such as the "Memorandum of Understanding (MOU) Among DHS and U.S. Department of the Interior (DOI) and U.S. Department of Agriculture (USDA) Regarding Cooperative National Security and Counterterrorism Efforts on Federal Lands along the United States' Borders" signed in March 2006, that includes general guidelines, pursuant to applicable law, on BP activities, such as patrol, within lands managed by the DOI, such as CPNWR, and USDA. CPNWR will continue to request that OBP consult with the FWS on all of their actions before implementing them on the CPNWR.

CPNWR will also continue their effort to present training and orientation sessions for OBP, CBP, and DEA agents to increase their awareness of appropriate operations in wilderness. Additionally, CPNWR will assist OBP in preparing a training video that provides guidelines on low impact wilderness travel techniques. This training, if followed, should help minimize impacts to pronghorn and other sensitive resources in the CPNWR.

In response to increased illegal traffic in the CPNWR, border law enforcement has increased. Though interagency agreements exist, as explained in the "Description of the Proposed Action" and above, to minimize impacts from border law enforcement activities, the agreements do not prevent border law enforcement from conducting activities, such as off-road travel, outside of guidelines designed to minimize impacts, in emergency situations involving human life, health, safety of persons within the area, or posing a threat to national security. The CPNWR will continue to present training and orientation sessions for Customs and Border Protection (CBP), Office of Border Patrol (OBP), and Drug Enforcement Administration (DEA) agents to increase their awareness of appropriate operations in wilderness, and assist OBP in preparation of a training video that provides guidelines on low impact wilderness travel techniques.

Law Enforcement - CPNWR

CPNWR's law enforcement patrol activities, which have increased in response to increased illegal immigrant/smuggler traffic, may disturb pronghorn and degrade their habitat. A large percentage of illegal and law enforcement vehicle activity on the CPNWR occurs within Mohawk and Growler Valleys (see figure 4.1 in the WFEIS), both are important areas for pronghorn. Law enforcement activities may cause pronghorn to flee an area and temporarily

avoid or less frequently use areas where patrol is focused. This would be particularly detrimental to pronghorn during times of peak physiological stress such as during a drought period or the fawning season. Vehicle use associated with enforcement activities can also cause soil erosion and changes in surface hydrology (from channelization of water in entrenched vehicle track prisms), which locally may substantially impact vegetation that provides forage and cover to pronghorn. If they travel off-road, in addition to the impacts described above, patrol vehicles can crush and destroy vegetation that provides forage and cover to pronghorn. CPNWR law enforcement follows the same guidelines for vehicle travel within CPNWR established by the MOU for BP (Curtis McCasland, CPNWR, personal communication, July 25, 2006). The guidelines restrict enforcement vehicles to existing designated public and administrative roads and/or trails, except in emergencies involving human life, health, safety of persons within the area, or posing a threat to national security (see the MOU for further guideline detail). Patrol vehicles could also collide with pronghorn causing injury and/or death. However, because pronghorn are relatively rare and because we are not aware of any such collisions in the U.S., or along unpaved routes anywhere within the range of the Sonoran pronghorn, we believe the chance of such collisions are low.

To minimize impacts to Sonoran pronghorn, trips into pronghorn habitat by CPNWR law enforcement are minimized to the greatest extent possible. Most trips into sensitive areas on the CPNWR are conducted in response to requests for help by resource staff or other Federal law enforcement officers. CPNWR law enforcement officers receive training to increase their awareness of appropriate operations in wilderness and participate in staff meetings and supervisory meetings where requests to minimize activities in pronghorn habitat (to reduce impacts to pronghorn and their habitat) are made and discussed. Furthermore, CPNWR law enforcement officers are routinely dispatched into areas with the specific purpose of trying to minimize illegal traffic in areas where pronghorn recovery actions are being implemented. The interdiction of illegal traffic prior to entering into these important areas is critical for the long-term management of pronghorn on the CPNWR.

Also, as described in our draft biological opinion on the CBP/OBP Permanent Vehicle Barrier Project issued on June 28, 2006 (consultation number 22410-2006-F-0113), we expect that the installation of the permanent vehicle barrier on CPNWR, once completed, will significantly reduce illegal vehicle traffic crossing through the CPNWR. Furthermore, illegal pedestrian traffic should also be reduced because improvements to the border road will facilitate interdiction of immigrants and smugglers along the border itself. Decreased illegal traffic should reduce the frequency of law enforcement pursuits through the CPNWR, which consequently will minimize disturbance to pronghorn and degradation of their habitat.

Visitor Service Management

Implementing the "Visitor Service Management" element of the CCP may result in disturbance to pronghorn and their habitat. Vehicles associated with implementing this element could also collide with pronghorn causing injury and/or death. However, for the same reasons stated above, we believe the chances of such collisions are low. Closing public access to approximately the eastern three-quarters of the CPNWR during the fawning season, as described in detail above,

should benefit pronghorn through reducing disturbance from recreational activities to pronghorn during this critical period.

Motorized Recreational Use

Continuing to allow recreational vehicles to use non-wilderness travel corridors (including the unpaved el Camino del Diablo and Christmas Pass Road) and non-wilderness access roads (all dirt-roads) may result in continued disturbance to pronghorn and degradation of their habitat. Roads have been documented to generally affect wildlife and habitat in a number of ways, including the fragmentation and degradation of habitat, and direct mortality from impacts with vehicles. Though larger, paved roads with high traffic volumes have a greater likelihood of impacting wildlife, even dirt roads, such as el Camino del Diablo and Christmas Pass Road, can cause direct, permanent disturbance of the habitat, cause erosion that can reduce the quality of habitat, and facilitate invasion by non-native pest plant species that can displace native habitat through competition or fire. Human use of roads can result in short-term denial of access to habitat for pronghorn or cause pronghorn to flee the area when cars or people approach. Seasonal closures, in addition to restricting recreational vehicle use to the aforementioned corridors/roads only, however, will greatly minimize impacts to pronghorn from motorized recreational use of the CPNWR.

Non-motorized Recreational Use

Allowing hiking and camping on the CPNWR may result in continued disturbance to pronghorn and degradation of their habitat. As described above, non-motorized recreation activities may disrupt wildlife in many ways, such as by displacing them and/or causing physiological effects (increased heart rate, etc.). The seasonal closures described above, however, will minimize adverse effects to pronghorn from hikers and campers, who could otherwise access the eastern portion of the CPNWR by vehicle, during this critical period. Additionally, as included in the "Wilderness Stewardship" portion of the "Proposed Action", CPNWR will encourage back-country visitors to hike on administrative trails in order to concentrate user impacts on already affected areas; if successful, this will assist in minimizing impacts to pronghorn habitat. Implementing the Leave-No-Trace program should also help minimize degradation of pronghorn habitat by visitors.

Use of Stock Animals

Allowing recreational activities involving pack and saddle stock on the CPNWR may result in disturbance to pronghorn (i.e., deny pronghorn access to important habitat or waters) and degradation of their habitat (i.e., stock could introduce non-native species, cause erosion, etc.). The seven stock-related restrictions (i.e., no grazing or use of water resources on CPNWR, restrictions in size of groups and allowed use areas, etc.), however, will minimize potential adverse impacts to pronghorn from stock associated activities.

Hunting

Allowing hunting of desert bighorn sheep may adversely affect pronghorn. Many effects to pronghorn from hunting will be similar to those described under "Motorized" and "Non-motorized Recreational Use" and "Use of Stock Animals" because hunters must access the allowable hunting areas by foot, vehicle, or stock animal. Beyond these effects, we anticipate impacts to pronghorn from the bighorn sheep hunting program will be minimal because

pronghorn and bighorn sheep habitat typically do not overlap (most impacts from hunters will be in the mountains away from suitable pronghorn habitat) and because bighorn sheep hunting is conducted in December, a time during which pronghorn are typically experiencing less stress (i.e., it is outside of the fawning season, temperatures are cooler, and forage is typically available due to winter rainfall, unless there is a serious drought) compared to other times such as the fawning season (February to July).

Pronghorn could be disturbed and their habitat degraded if CPNWR allows hunting of additional game and predator species in the future. However, these hunts will only be allowed if it is determined that the U.S. subpopulation of Sonoran pronghorn has stabilized (i.e., either it has met the criteria for downlisting described in the "Status of the Species" and it has been downlisted or the environmental documents are being processed to finalize the downlisting, or the pronghorn population has remained stable with over 200 individuals for several years; Curtis McCasland, CPNWR, personal communication, June 30, 2006) and would not be jeopardized by such hunts. Additionally, predator hunts would only be authorized if the hunts would benefit pronghorn. The expanded hunting program would be subject to further Intra-Service section 7 consultation.

Educational and Interpretive Services

Participating and providing educational and interpretive services will generally benefit pronghorn if they result in heightened public awareness of and sensitivity toward pronghorn. Pronghorn could be adversely affected should the CPNWR develop a loop road in the non-wilderness portion of the Childs Valley in cooperation with BLM. However, this road will only be developed if Sonoran pronghorn populations have stabilized as described above and that such use would not jeopardize the subspecies. Additionally, the loop road development would be subject to further Intra-Service section 7 consultation.

Issues Covered by Existing Policy, Law, or Regulations

Border Law Enforcement

The effects of border law enforcement on pronghorn are discussed above.

Fire Management

Fire suppression activities may adversely affect pronghorn in a various ways (i.e., presence of fire crews could disturb pronghorn; fire crew vehicles and fire suppression activities, like creating fuel breaks, could degrade pronghorn habitat; etc.), however, all suppression activities that may affect pronghorn, once conducted, are subject to emergency section 7 consultation procedures. Fire suppression will benefit pronghorn if it prevents further destruction (burning) of pronghorn habitat. When CPNWR develops a fire management plan, it will be subject to further section 7 consultation.

Trespass Livestock and Pets

The effects on pronghorn from the removal of trespass livestock are discussed above. Though the presence of pets could disturb pronghorn, the requirement that pets must be leashed and under the control of the owner should minimize their impact on pronghorn (i.e., pets will not be

able to chase pronghorn). We anticipate that the presence of pets on leash will affect pronghorn in similar ways as the presence of humans (described above).

Pronghorn Status

The most recent formal Sonoran pronghorn survey in December 2004 resulted in an estimated 58 wild pronghorn in the U.S. population, which was a substantial increase from an estimated 21 wild pronghorn in the U.S in 2002. Based on casual surveys and estimated fawn survival, the population in 2005 was roughly estimated at 75 wild pronghorn in the U.S. These increases are likely attributable to favorable habitat conditions since the drought in 2002 as well as emergency recovery actions such as forage enhancement plots and emergency waters (see details under the "Environmental Baseline"), which undoubtedly offset to some extent the effects of drought and barriers that prevent pronghorn from accessing greenbelts and water, such as the Gila River and Río Sonoyta. We expect these recovery actions may also help offset adverse effects described herein as well as other activities within the action area that disturb pronghorn and their habitat. Because pronghorn remain critically endangered, however, it is imperative that all adverse effects to pronghorn from the current and proposed activities are avoided, minimized, and/or offset to the greatest extent possible.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Most lands within the action area (current range of the pronghorn within Arizona) are managed by Federal agencies; thus, most activities that could potentially affect pronghorn are Federal activities that are subject to section 7 consultation. The effects of these Federal activities are not considered cumulative effects. Relatively small parcels of private and State lands occur within the currently-occupied range of the pronghorn near Ajo and Why, north of the BMGR from Dateland to Highway 85, and from the Mohawk Mountains to Tacna. State inholdings in the BMGR have been acquired by the Department of Defense. Continuing rural and agricultural development, recreation, vehicle use, grazing, and other activities on private and State lands adversely affect pronghorn and their habitat. MCAS-Yuma (2001) reports that 2,884 acres have been converted to agriculture near Sentinel and Tacna. These activities on State and private lands and the effects of these activities are expected to continue into the foreseeable future. Historical habitat and potential recovery areas currently outside of the current range are also expected to be affected by these same activities on lands in and near the action area in the vicinity of Ajo, Why, Yuma, and along the Gila River.

Of particular concern are increasing illegal border crossings by undocumented immigrants and smugglers. In fiscal year 2005, the Yuma Sector of the OBP apprehended record numbers of illegal immigrants and smugglers, and from October 1, 2005 to May 2006, 96,000 arrests have been made, which is a 13% increase over the same time period in 2005 (Gerstenzang 2006). In 2001, estimates of undocumented migrant traffic reached 1,000 per night in OPCNM alone

(National Park Service 2001 or OPCNM 2001) and an estimated 150,000 people entered the OPCNM illegally from Mexico (Milstead and Barns 2002). Increased presence of the Border Patrol in the Douglas, Arizona area, and in San Diego (Operation Gatekeeper) and southeastern California, have pushed illegal immigrant and smuggler traffic into remote desert areas, such as CPNWR, OPCNM, Tohono O'odham Nation, and BMGR (Klein 2000). Though the operation of Camp Grip within the CPNWR and the temporary camp detail at Bates Well on the OPCNM have reduced the number of illegal drive-throughs in the eastern portion of the CPNWR in FY 2005 (Hubbard 2005, as cited in U.S. Customs and Border Protection 2005), drive-throughs have steadily increased on the BMGR and CPNWR over the past three years (U.S. Customs and Border Protection 2005). Over the past seven years, the number of illegal roads and foot trails created by illegal immigrants within the CPNWR has increased substantially (U.S. Customs and Border Protection 2005). These illegal crossings and law enforcement response have resulted in route proliferation, off-highway vehicle activity, increased human presence in backcountry areas, discarded trash, abandoned vehicles, cutting of firewood, illegal campfires, and increased chance of wildfire. Habitat degradation and disturbance of pronghorn almost certainly result from these extensive illegal activities. Despite increasingly high levels of illegal activity throughout the action area, pronghorn in the U.S. have increased since 2002 as discussed above, possibly due to the construction of forage plots and emergency waters.

We expect illegal activities and their effects on pronghorn to continue, though they should be significantly reduced once the CBP/OBP Permanent Vehicle Barrier Project (described in our draft biological opinion issued June 28, 2006; consultation number 22410-2006-F-0113), is completed. Also a recent bill (S2611) passed by the Senate could create a guest worker program whereby Mexican nationals could legally cross the border to work in the U.S. If such a program is initiated, it might greatly reduce future illegal immigration and law enforcement response, with concomitant reductions in habitat degradation and suspected disturbance of pronghorn.

CONCLUSION

Sonoran Pronghorn

After reviewing the current status of the Sonoran pronghorn, the environmental baseline for the action area, the effects of the proposed activities associated with implementation of the CCP, and the cumulative effects, it is our biological opinion the proposed action is not likely to jeopardize the continued existence of the Sonoran pronghorn. No critical habitat has been designated for this species, therefore, none will be affected. Our conclusion is based on the following:

1. The Sonoran pronghorn population has increased since 2002, despite increasingly high levels of human use in the form of off- and on-road vehicle and foot travel by smugglers, illegal immigrants, and law enforcement.

2. Restrictions, prohibitions, and provisions (e.g., the eastern three-quarters of the CPNWR will be seasonally closed to public access during pronghorn fawning season, no stock animal grazing or use of water resources on CPNWR will be allowed, aerial monitoring of pronghorn will only be conducted during cooler times of the day or year, etc.)

described in the proposed action will reduce adverse effects to Sonoran pronghorn from certain activities proposed by the CCP.

3. Conservation and recovery actions for pronghorn (e.g., forage enhancement plots, waters, etc.) included in the proposed action will offset adverse effects of certain activities proposed by the CCP as well as make the pronghorn population in the U.S. more secure and more resistant to drought and other stressors.

4. When added to the environmental baseline, the status of the species, and cumulative effects, the effects of the proposed action, which include beneficial restrictions, limitations, and provisions, do not reduce appreciably the likelihood of survival and recovery of the subspecies in the wild. Therefore, the proposed action will not jeopardize the continued existence of the subspecies. As proposed, implementation of the CCP will not significantly adversely affect important fawn recruitment or significantly adversely affect occupied pronghorn habitat. Concerns about disturbance to pronghorn and habitat degradation are minimized by the CCP's restrictions, limitations, and provisions. The net effect of CCP implementation on the Sonoran pronghorn is beneficial.

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including any conservation measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3). "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

We do not anticipate the proposed action will result in incidental take of Sonoran pronghorn for the following reasons:

1. Restrictions, prohibitions, and provisions described in the proposed action would reduce adverse effects of certain activities proposed by the CCP (see rationale 2 under "Conclusion" above).

2. Conservation and recovery actions for pronghorn included in the proposed action would offset adverse effects of certain activities proposed by the CCP as well as make the pronghorn population in the U.S. more secure and more resistant to drought (when pronghorn are most sensitive to human disturbance) and other stressors (see rationale 3 under "Conclusion" above).

3. Pronghorn are rare on the CPNWR, making encounter with human activities a relatively rare event.

4. With the exception of activities subject to separate permitting under 10(a)(1)(A) and separate consultation, no incidental take of Sonoran pronghorn is known to have occurred on the CPNWR or elsewhere in Arizona due to activities authorized by the CCP.

LESSER LONG-NOSED BAT
STATUS OF THE SPECIES

A. Species Description

The lesser long-nosed bat is a medium-sized, leaf-nosed bat. It has a long muzzle and a long tongue, and is capable of hover flight. These features are adaptations for feeding on nectar from the flowers of columnar cacti (e.g., saguaro; cardon, *Pachycereus pringlei*; and organ pipe cactus, *Stenocereus thurberi*) and from paniculate agaves (e.g., Palmer's agave, *Agave palmeri*) (Hoffmeister 1986). The lesser long-nosed bat was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in 1988 (U.S. Fish and Wildlife Service 1988). No critical habitat has been designated for this species. A recovery plan was completed in 1994 (U.S. Fish and Wildlife Service 1997). Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. Recovery actions include roost monitoring, protection of roosts and foraging resources, and reducing existing and new threats.

B. Distribution and Life History

The lesser long-nosed bat is migratory and found throughout its historical range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. It has been recorded in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Peloncillo Mountains (Cochise County), and south to the international boundary. Roosts in Arizona are occupied from late April to September (Cockrum and Petryszyn 1991) and on occasion, as late as November (Sidner 2000); the lesser long-nosed bat has only rarely been recorded outside of this time period in Arizona (U. S. Fish and Wildlife Service 1997, Hoffmeister 1986, Sidner and Houser 1990). In spring, adult females, most of which are pregnant, arrive in Arizona gathering into maternity colonies. These roosts are typically at low elevations near concentrations of flowering columnar

cacti. After the young are weaned these colonies disband in July and August; some females and young move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Adult males typically occupy separate roosts forming bachelor colonies. Males are known mostly from the Chiricahua Mountains and recently the Galiuro Mountains (personal communication with Tim Snow, Arizona Game and Fish Department, 1999) but also occur with adult females and young of the year at maternity sites (U. S. Fish and Wildlife Service 1997). Throughout the night between foraging bouts both sexes will rest in temporary night roosts (Hoffmeister 1986).

Lesser long-nosed bats appear to be opportunistic foragers and extremely efficient fliers. They are known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 15 miles, and in Mexico at 25 miles and 36 miles (one way) (Dalton *et al*. 1994; personal communication with V. Dalton, 1997; personal communication with Y. Petryszyn, University of Arizona, 1997). Steidl (personal communication, 2001) found that typical one-way foraging distance for bats in southeastern Arizona is roughly 12.5 miles. A substantial portion of the lesser long-nosed bats at the Pinacate Cave in northwestern Sonora (a maternity colony) fly 25-31 miles each night to foraging areas in OPCNM (U.S. Fish and Wildlife Service 1997). Horner *et al.* (1990) found that lesser long-nosed bats commuted 30-36 miles round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 47 miles each night. Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest known potential roost site (personal communication with Yar Petryszyn, University of Arizona, 1997).

Lesser long-nosed bats, which often forage in flocks, consume nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. Nectar of these cacti and agaves is high energy food. Concentrations of some food resources appear to be patchily distributed on the landscape and the nectar of each plant species used is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available primarily from July through October. Columnar cacti occur in lower elevational areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desert scrub areas, semi-desert grasslands and shrublands, and into the oak woodland (Gentry 1982). Lesser long-nosed bats are important pollinators for agave and cacti, and are important seed dispersers for some cacti.

C. Status and Threats

Recent information indicates that lesser long-nosed bat populations appear to be increasing or stable at most Arizona roost sites identified in the recovery plan (AGFD 2005, Tibbitts 2005, Wolf and Dalton 2005). Lesser long-nosed bat populations additionally appear to be increasing or stable at other roost sites in Arizona and Mexico not included for monitoring in the recovery plan (Sidner 2005). Less is known about lesser long-nosed bat numbers and roosts in New Mexico. Though lesser long-nosed bat populations appear to be doing well, many threats to their stability and recovery still exist, including excess harvesting of agaves in Mexico; collection and destruction of cacti in the U.S.; conversion of habitat for agricultural and livestock uses,

including the introduction of buffelgrass, an exotic, invasive grass species; wood-cutting; drought; fires; human disturbance at roost sites; and urban development.

Approximately 20 – 25 large lesser long-nosed bat roost sites, including maternity and late-summer roosts, have been documented in Arizona (personal communication with Scott Richardson, FWS, 2006). Of these, 10 – 20 are monitored on an annual basis depending on available resources. Monitoring in Arizona in 2004 documented approximately 78,600 lesser long-nosed bats in late-summer roosts and approximately 34,600 in maternity roosts. Ten to 20 lesser long-nosed bat roost sites in Mexico are also monitored annually. Over 100,000 lesser long-nosed bats are found at just one natural cave at Pinacate National Park, Sonora, Mexico (Cockrum and Petryszyn 1991). The numbers above indicate that although a relatively large number of lesser long-nosed bats exist, the relative number of known large roosts is quite small.

Maternity roosts, suitable day roosts, and concentrations of food plants are all critical resources for the lesser long-nosed bat. All of the factors that make roost sites useable have not yet been identified, but maternity roosts tend to be very warm and poorly ventilated (U.S. Fish and Wildlife Service 1997). Human presence/disturbance at roosts is clearly an important factor as bats appear to be particularly sensitive to human disturbance at roost sites. For example, illegal activity, presumably by immigrants or smugglers, at the Bluebird maternity roost site, caused bats to abandon the site in 2002, 2003, and 2005. The presence of alternate roost sites may be critical when this type of disturbance occurs.

The lesser long-nosed bat recovery plan (U.S. Fish and Wildlife Service 1997) identifies the need to protect foraging areas and food plants such as columnar cacti and agaves. More information regarding the average size of foraging areas around roosts would be helpful to identify the minimum area around roosts that should be protected to maintain adequate forage resources.

The 2005 fires referred to under Sonoran Pronghorn "Status of the Species" affected some lesser long-nosed bat foraging habitat, though the extent is unknown. For example, the Goldwater, Aux, and Sand Tank Fire complexes on BMGR-East burned through and around isolated patches of saguaros, but the immediate effects and longer term impacts of the fires on saguaros are not yet known. Monitoring of saguaro mortality rates should be done to assess the impacts on potential lesser long-nosed bat foraging habitat. Fire suppression activities associated with the 2005 fires could also have affected foraging habitat. For example, slurry drops may have left residue on saguaro flowers, which could have impacted lesser long-nosed bat feeding efficiency or resulted in minor contamination.

This year's drought (see the "Environmental Baseline" for Sonoran pronghorn for further details regarding drought) may affect lesser-long nosed bat foraging habitat, though the effects of drought on bats are not well understood. The drought in 2004 resulted in near complete flower failure in saguaros throughout the range of lesser-long nosed bats. During that time however, in lieu of saguaro flowers, lesser-long nose bats foraged heavily on desert agave (*Agave deserti*) flowers, a plant not typically used by lesser long-nosed bats (personal communication with Scott Richardson, FWS, March 20, 2006). Monitoring bats and their forage this year is needed to better understand the effects of drought on this species.

We have produced numerous biological opinions on the lesser long-nosed bat since it was listed as endangered in 1988, some of which anticipated incidental take. Incidental take has been in the form or direct mortality and injury, harm, and harass and has typically been only for a small number of individuals. Because incidental take of individual bats is difficult to detect, incidental take has often been quantified in terms of loss of forage resources, decreases in numbers of bats at roost sites, or increases in proposed action activities.

A few examples of more recent biological opinions that anticipated incidental take for lesser long-nosed bats are summarized below. The 2005 biological opinion for implementation of the Coronado National Forest Land and Resource Management Plan (U.S. Forest Service) included incidental take in the form of harm or harass. The amount of take for individual bats was not quantified; instead take was to be considered exceeded if simultaneous August counts (at transitory roosts in Arizona, New Mexico, and Sonora) drop below 66,923 lesser long-nosed bats (the lowest number from 2001 – 2004 counts) for a period of two consecutive years as a result of the action. The 2004 biological opinion for the Bureau of Land Management Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management included incidental take in the form of harassment. The amount of incidental take was quantified in terms of loss of foraging resources, rather than loss of individual bats. The 2003 biological opinion for Marine Corps Air Station (MCAS) – Yuma Activities on the Barry M. Goldwater Range included incidental take in the form of direct mortality or injury (five bats every 10 years). Because take could not be monitored directly, it was to be considered exceeded if nocturnal low-level helicopter flights in certain areas on the BMGR increased significantly or if the numbers of bats in the Agua Dulce or Bluebird Mine roosts decreased significantly and MCAS-Yuma activities were an important cause of the decline. The 2002 biological opinion for Department of the Army Activities at and near Fort Huachuca (Fort), Arizona anticipated incidental take in the form of direct mortality or injury (six bats over the life of the project), harassment (20 bats per year), and harm (10 bats over the life of the project).

ENVIRONMENTAL BASELINE

A. Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The FWS has determined that the action area for the lesser long-nosed bat includes the areas directly affected by the activities associated with implementation of the CCP and an area around the project defined by a circle with a radius of 36 miles (the maximum documented one-way foraging distance of the lesser long-nosed bat). The action area represents only a small portion of the lesser long-nosed bat's range.

Management of the action area is largely by Federal agencies, as described in the "Action Area" for Sonoran pronghorn. The action area for the lesser long-nosed bat also includes part of the Tohono O'odham Nation (TON) lands and lands near the border in Sonora.

B. Terrain, Vegetation Communities, and Climate in the Action Area

A description of the region encompassing the action area has been previously provided (see "Environmental Baseline", part B. Terrain, Vegetation Communities, and Climate in the "Action Area" for the Sonoran pronghorn).

The action area encompasses multiple mountain ranges, such as the Tinajas Altas, Cabeza Prieta, Tule, Sierra Pinta, Granite, Agua Dulce, Growler, and Childs mountains. Suitable day and night roost sites occur or potentially occur within these ranges, however, most have not recently been surveyed for lesser long-nosed bat roosts with the exception of the Growler Mountains where the Bluebird Mine roost site is located.

C. Status of the Lesser Long-Nosed Bat in the Action Area

Based on the known foraging distances for lesser long-nosed bats, it is likely that this species forages throughout portions of the BMGR, CPNWR, OPCNM, and TON where flowers and fruit of saguaro, organ pipe, prickly pear, and agave are available.

Three large maternity roosts occur in the action area, including Bluebird Mine, Copper Mountain Mine, and Pinacate Cave. Bluebird Mine, located along the eastern border of CPNWR in the Growler Mountains, generally supports an estimated 3,000 lesser long-nosed bats at the peak of annual occupancy (U.S. Fish and Wildlife Service 1997). The highest estimate of lesser long-nosed bats using Bluebird Mine from 2001-2005 bats was 4,500. They abandoned the mine however in 2002, 2003, and 2005 due to disturbance from illegal activities. In 2004, the bats returned to the mine after CPNWR staff placed a high steel fence around the mine to prevent disturbance. The bats returned to the mine in 2005, however abandoned the site once again after the fence was damaged, presumably by illegal immigrants or smugglers. The bats returned again in 2006.

Copper Mountain Mine, located within the OPCNM about 10 miles east of the CPNWR-OPCNM boundary, supports approximately 25,000 bats at the peak of annual occupancy (National Park Service 2002). The highest estimate of lesser long-nosed bats using Copper Mountain Mine from 2001-2005 bats was 35,000.

The largest maternity roost in the project area is Pinacate Cave in northern Sonora, Mexico. Approximately 30 miles south of the boundary (international border) between CPNWR and the Pinacate and Altar Desert Biosphere Reserve, this roost is estimated to support 130,000 bats each year (U.S. Fish and Wildlife Service 1997). In May 2006, approximately 200,000 lesser long-nosed bats were counted at the Pinacate Cave.

Before they give birth, female bats probably occasionally move between the Bluebird and Copper Mountain roosts, and it has been recommended that these two roosts be censused simultaneously to avoid double-counting bats (U.S. Fish and Wildlife Service 1997). Observations at Copper Mountain and Pinacate Cave indicate that they are occupied from mid-April to early-to-mid-September (U.S. Fish and Wildlife Service 1997), although these roosts reach their peak occupancy in late spring/early summer.

Though OPCNM and CPNWR monitor the Copper Mountain and Bluebird roosts annually to determine the presence, abundance, and disturbance of lesser long-nosed bats, including examining the roost year round for evidence of human entry, the rest of OPCNM and CPNWR has not been well surveyed to determine the number of additional day and night roosts that might exist in natural caves and/or mineshafts. A small roost or roosts is known to occur in the Agua Dulce Mountains in the southeastern corner of the CPNWR, though the current status (i.e., whether lesser long-nosed bats are still using the site) of the roost is unknown. Smaller day roosts are known in other mine tunnels, and are also suspected in other mines and natural rock crevices and caves. Short-term night roosts are known in natural caves, under the eaves of buildings, and inside several abandoned buildings associated with past ranching activities. It is likely that there is within- and between-season interchange between these colonies, perhaps even within and between nights (U. S. Fish and Wildlife Service 1997).

Flowers and fruits of saguaro, organ pipe cactus, and cardon provide nearly all of the energy and nutrients obtained by pregnant and lactating females roosting in the Sonoran Desert in the spring and early summer (U.S. Fish and Wildlife Service 1997). Saguaro, which is common and abundant throughout much of the BMGR, CPNWR, and OPCNM; and organ pipe cactus, which is common at OPCNM and localized in the eastern portions of CPNWR and BMGR, flower in May and fruit mature in June and July (Benson and Darrow 1982). Lesser long-nosed bats feed on both the nectar and fruits of these cacti. When cacti fruit are scarce or unavailable in late July or early August, agave nectar may be the primary food resource for lesser long-nosed bats in BMGR, OPCNM, CPNWR, and TON. Agaves typically bolt or flower and provide a nectar resource for foraging bats from about July into October. Desert agave occurs in mountainous areas within the study area. As mentioned above under "Status of the Species", last year's fires and this year's drought may have affected/may affect some lesser long-nosed bat foraging habitat within the action area, though the extent is unknown.

A number of activities occur in the action area that could affect bats. In a September 30, 2002, biological opinion, we concurred with the BLM that management of grazing leases on the Ajo allotments may affect, but is not likely to adversely affect, the bat. Our 1997 biological opinion on the OPCNM General Management Plan, found that the proposed action could result in incidental take of bats from recreation; specifically from unauthorized human disturbance to the Copper Mountain maternity roost. The dramatic increases in undocumented immigrants (see "Environmental Baseline, part E. Threats" for the Sonoran pronghorn for further detail about undocumented immigrant activity) and the associated damage resulting to the landscape from their activities, as well the activities of law enforcement in pursuit of undocumented immigrants, is becoming an increasing threat, not just to lesser long-nosed bats but to all wildlife of the region. As stated earlier, suspected illegal immigrants entered the Bluebird Mine on CPNWR in June 2002, which resulted in at least four dead bats and abandonment of the roost. The bats returned to the mine in 2005; however, they abandoned the site once again after the fence was damaged by illegal immigrants. Both OPCNM and CPNWR are planning to implement additional protective measures at Copper Mountain and Bluebird Mine, such as the construction of bat-friendly gates at roost entrances to prevent illegal human entry. However, lesser long-nosed bats are sensitive to bat gates and may not adapt readily to their use. Therefore, use of bat gates to protect these roosts may not be a feasible alternative. The CBP/OBP currently conducts many activities, such as Tucson Sector patrol, within the action area on which they have not

completed section 7 consultation with us. Some of their activities may degrade lesser long-nosed bat foraging habitat (e.g., vehicle impacts to saguaros and agaves) or disturb lesser long-nosed bats (e.g., use of lights near forage resources at night). We are, however, currently working with them to avoid, minimize, and offset impacts to listed species as well as to complete consultation on their ongoing and proposed actions within the area.

EFFECTS OF THE PROPOSED ACTION

Implementation of the wildlife and habitat management, wilderness stewardship, and visitor service management elements of the proposed CCP may result in degradation of lesser long-nosed bat foraging habitat and/or disturbance to lesser long-nosed bats. Though we anticipate that impacts to lesser long-nosed bats will be limited, adverse effects to bats could result from vehicular and foot traffic associated with recreational and management/monitoring activities and overflights for wildlife monitoring and management of waters described in sections 2.1, 2.5, and part of 2.6 of the CCP. These activities may disturb lesser long-nosed bats and/or degrade their habitat in a number of ways, such as from associated noise and light pollution; disturbance of soils; and crushing, destruction, or removal of lesser long-nosed bat forage resources (i.e., columnar cacti and agave). However, no known or suspected roost sites, other than the Bluebird Mine, will be directly impacted by implementation of the CCP and activities directly affecting the Bluebird mine, such as fence maintenance, should be beneficial to lesser long-nosed bats. Furthermore, the CCP does not authorize any direct removal or destruction of forage resources.

Though the CCP would authorize some activities that may be detrimental to lesser long-nosed bats, restrictions, prohibitions, and provisions included in the CCP should generally reduce disturbance to lesser long-nosed bats and degradation of their habitat. Additionally, certain wildlife and habitat management activities included in the CCP will aid in the recovery and conservation of lesser long-nosed bats. Overall, implementation of the CCP will be beneficial to lesser long-nosed bats on the CPNWR.

Wildlife and Habitat Management

Though some activities associated with the "Wildlife and Habitat Management" element of the CCP may result in disturbance to lesser long-nosed bats and degradation of their habitat, most will have little effect on the lesser long-nosed bats. Overall, implementation of this element will benefit lesser long-nosed bats.

Lesser Long-Nosed Bat Conservation

Proposed lesser long-nosed bat recovery and conservation activities, such as restricting access to and maintaining fencing around the Bluebird Mine maternity roost site, will result in net beneficial effects to the lesser long-nosed bat. Maintaining a fence around the mine site could adversely affect lesser long-nosed bats if they fly into the fence; however, CPNWR has never documented this during their monitoring efforts (counting bats as they leave the roost site) and have never found dead bats on or near the fence during routine fence maintenance checks. Developing and placing a bat-friendly gate at the entrance of Bluebird Mine may benefit the lesser long-nosed bat; however as mentioned in the "Environmental Baseline" for this species, lesser long-nosed bats are sensitive to bat gates and may not adapt readily to their use.

Therefore, use of gates to protect these roosts may adversely affect lesser long-nosed bats and may not be a feasible conservation measure.

Consequently, CPNWR would only place gates at the mine entrance(s) if all efforts, including maintaining fencing around the site and law enforcement, fail to keep trespassers away from the roost site. Gates would be placed, on an experimental basis, on the upper adits of the mine first (Curtis McCasland, FWS, personal communication July 26, 2006). Lesser long-nosed bats use the upper adits, however, the maternity colony is located in the lower adit. Therefore, placing the gates on the upper adits, though they may affect bats using the upper adits, should not affect bats from the maternity colony using the lower adit. Bat gates would be monitored nightly to ensure bats continue to enter/exit the upper adits normally and would be removed if the gates disrupt the normal entering/exiting patterns of the bats. If bat use of the upper adits is not affected by the gates, the gates would be placed on entrance to the maternity colony. Again, bat use of the entrance would be monitored nightly to ensure bats continue to enter and exit normally and would be removed if bats were disrupted. Should CPNWR decide to further develop a design for and use gates at the Bluebird Mine, they will request formal Intra-Service consultation specifically on this activity with our office (Curtis McCasland, FWS, personal communication July 26, 2006).

Seasonal Closures

Though closing public access to approximately the eastern three-quarters of the CPNWR (roughly from five miles east of Tule Well to the eastern boundary) typically from March 15 to July 15 was implemented to protect pronghorn, these dates also generally correspond with the time that lesser long-nosed bats use the Bluebird Mine maternity roost, located in the eastern part of the CPNWR. Consequently, this seasonal closure, while it continues in effect, should also benefit lesser long-nosed bats through minimizing the possibility that recreational users will disturb bats at the Bluebird Mine.

Other Wildlife Surveys, Management, and Research

Most surveys should have no to very little effect (pupfish, Peirson's milk vetch, etc) on lesser long-nosed bats. Some surveys, such as bighorn sheep aerial surveys, and management activities associated with other wildlife, such as hauling water to wildlife waters, could result in temporary disturbance to lesser long-nosed bats (from aircraft noise over the roost). However, we do not anticipate that bats will be affected by these activities because bighorn sheep surveys are conducted in the fall and winter, outside of the period when lesser long-nosed bats use the Bluebird Mine roost, and because no water is hauled to areas near the roost (the nearest water hauling activity occurs about 12 miles southwest of the Bluebird Mine). Also, because water hauling activities would occur during the day, they would not affect behavior of foraging lesser long-nosed bats. Other monitoring, management, and research activities will likely beneficially affect lesser long-nosed bats. For example, facilitating and supporting research on, as well as monitoring and controlling non-native plant species and removing trespass livestock should benefit lesser long-nosed bat foraging habitat (reduce or prevent introduction/spread of non-native plants, minimize trampling of potential bat foraging habitat, etc.).

Wilderness Stewardship

Implementing the "Wilderness Stewardship" element of the CCP may result in disturbance to lesser long-nosed bats and their habitat. Some activities associated with this element, however, will have no effect or a beneficial effect on lesser long-nosed bats.

Removal of hazards

Some wilderness stewardship activities (e.g., removing abandoned vehicles via tow-truck and/or helicopter, removing tow-darts, removing unexploded ordnance, etc.) may temporarily degrade lesser long-nosed bat habitat (from vehicular use of roads). However, in general these activities will beneficially affect lesser long-nosed bat habitat by reducing its exposure to potential hazards.

Administrative Trail Restrictions

Closing 20 miles of administrative trails to management vehicular use will generally benefit lesser long-nosed bat habitat by reducing its exposure to vehicles (the effects of vehicles on lesser long-nosed bat habitat are further discussed below). The administrative trails will, however, remain available to border law enforcement (i.e., OBP) use under the provisions of the Arizona Desert Wilderness Act of 1990 and the MOU, as described in the "Description of the Proposed Action" and the below. CPNWR will continue, however, to request that OBP consult with us on any of their actions (that may affect listed species), either proposed or current but not covered by section 7 consultation.

Impact monitoring

Monitoring impacts to wilderness from illegal immigrants/smugglers, law enforcement, and visitor use as well as monitoring campsites will benefit lesser long-nosed bats if it results in identifying areas where detrimental impacts to lesser long-nosed bat habitat are occurring and effective management responses are developed and implemented.

Childs Mountain Communications Site

Continuing to allow currently permitted uses of the Childs Mountain communications site and renewing permits as deemed necessary for human safety and efficient law enforcement may impact lesser long-nosed bats and their habitat. Lesser long-nosed bats foraging in the area may be disturbed from lights and noise associated with the facility. Because very few saguaros occur in the immediate vicinity of the site however, we anticipate effects to foraging lesser long-nosed bats will be minimal. Though no saguaros or agaves are directly impacted by the facilities at Childs Mountain, vehicle use of the access road could cause minor degradation of potential lesser long-nosed bat foraging habitat. Because vehicle travel on the access road at night is rare, we do not anticipate lesser long-nosed bat foraging behavior will be affected by vehicle access to the Childs's Mountain site.

Law Enforcement - OBP

In response to increased illegal traffic in the CPNWR, border law enforcement (particularly OBP) has increased. Both illegal traffic and law enforcement activities can adversely affect lesser long-nosed bats and their habitat as described below in "Law Enforcement – CPNWR" and in the "Cumulative Effects", as well as in other documents and biological opinions, such as the draft biological opinion, consultation number 22410-2006-F-0113, issued June 28, 2006 for the CBP/OBP Permanent Vehicle Barrier Project. As noted in the "Environmental Baseline", the

OBP has not completed consultation on many of their activities occurring within lesser long-nosed bat habitat. CPNWR does not have authority over OBP's activities within the CPNWR; however, interagency agreements exist, such as the "MOU Among DHS and DOI and USDA Regarding Cooperative National Security and Counterterrorism Efforts on Federal Lands along the United States' Borders" signed in March 2006, that include general guidelines, pursuant to applicable law, on BP activities, such as patrol, within lands managed by the DOI, such as CPNWR, and USDA. CPNWR will continue to request that OBP consult with the FWS on all of their actions before implementing them on the CPNWR.

CPNWR will also continue their effort to present training and orientation sessions for OBP, CBP, and DEA agents to increase their awareness of appropriate operations in wilderness. Additionally, CPNWR will assist OBP in preparing a training video that provides guidelines on low impact wilderness travel techniques. This training, if followed, should help minimize impacts to lesser long-nosed bat habitat and other sensitive resources in the CPNWR.

Law Enforcement - CPNWR

CPNWR's law enforcement patrol activities, which have increased in response to increased illegal immigrant/smuggler traffic, may disturb lesser long-nosed bats and degrade their habitat. Vehicle use associated with enforcement activities, if they occur near columnar cacti and agaves, can cause soil erosion and changes in surface hydrology (from channelization of water in entrenched vehicle track prisms) which may impact lesser long-nosed bat foraging habitat. If they travel off-road, in addition to the aforementioned impacts, patrol vehicles can crush and destroy lesser long-nosed bat forage plants (columnar cacti and agaves), particularly seedlings. CPNWR law enforcement follow the same guidelines for vehicle travel within CPNWR established by the MOU for BP (Curtis McCasland, CPNWR, personal communication, July 25, 2006). The guidelines restrict enforcement vehicles to existing designated public and administrative roads and/or trails, except in emergencies involving human life, health, safety of persons within the area, or posing a threat to national security (see the MOU for further guideline detail). Disturbed ground (from vehicle use) may be susceptible to colonization by invasive exotic plants such as buffelgrass or Sahara mustard. Exotic species may prevent the recruitment of lesser long-nosed bat forage species and may also carry fire that could also impact forage species. Most Sonoran Desert trees, shrubs, and cacti are very fire intolerant. For example, fires at Saguaro National Park resulted in greater than 20 percent mortality of mature saguaros (Schwalbe *et al.* 2000).

Lesser long-nosed bat foraging behavior may also be temporarily affected by nighttime law enforcement vehicle traffic if it occurs within bat foraging habitat. We anticipate that adverse effects to bats from law enforcement vehicle activity, however, will likely be somewhat limited because most law enforcement traffic occurs on the valleys floors (in response to illegal vehicle traffic using valley floors to cross the CPNWR), away from concentrated areas of bat forage resources, which primarily occur in the upper bajadas. Illegal pedestrian activity likely adversely affects lesser long-nosed bats and their habitat because illegal immigrants on-foot tend to travel through saguaro forests in the upper bajadas. Law enforcement typically does not pursue illegal pedestrians through the upper bajadas (because these areas are not generally accessible to vehicles), however, effects to lesser long-nosed bats from law enforcement in pursuit of illegal pedestrians are likely limited.

Also, as described in our draft biological opinion on the CBP/OBP Permanent Vehicle Barrier Project issued on June 28, 2006 (consultation number 22410-2006-F-0113), we expect that the installation of the permanent vehicle barrier on CPNWR, once completed, will significantly reduce illegal vehicle traffic crossing through the CPNWR. Furthermore, illegal pedestrian traffic should also be reduced because improvements to the border road will facilitate interdiction of immigrants and smugglers along the border itself. Decreased illegal traffic should reduce the frequency of law enforcement pursuits through the CPNWR, which consequently will minimize disturbance to lesser long-nosed bats and degradation of their foraging habitat.

Visitor Service Management

Implementing the "Visitor Service Management" element of the CCP may result in disturbance to lesser long-nosed bats and degradation of their habitat. Closing public access to approximately the eastern three-quarters of the CPNWR during from March 15 to July 15, as described above, however, should generally benefit lesser long-nosed bats through minimizing the possibility that recreational users will disturb bats at the Bluebird Mine.

Motorized Recreational Use

Continuing to allow recreational vehicles to use non-wilderness travel corridors (the unpaved el Camino del Diablo and Christmas Pass Road) and non-wilderness access roads (all of which are dirt-roads) may result in continued degradation of lesser long-nosed bat foraging habitat and temporary disturbance of foraging lesser long-nosed bats (if vehicle use occurs during the night). Though larger, paved roads with high traffic volumes have a greater likelihood of impacting wildlife habitat, even dirt roads, such as el Camino del Diablo and Christmas Pass Road, can cause direct, permanent disturbance of the habitat, cause erosion that can reduce the quality of habitat, and facilitate invasion by non-native pest plant species that can displace native habitat through competition or fire. Restricting recreational vehicle use to the aforementioned corridors/roads only, however, will minimize impacts to lesser long-nosed bats from motorized recreational use of the CPNWR.

Non-motorized Recreational Use

Allowing hiking and camping on the CPNWR may result in disturbance to lesser long-nosed bats and degradation of their habitat. Though we expect effects to lesser long-nosed bats will be minimal, lights and noise at night associated with non-motorized recreational activities may disrupt bat foraging behavior, and foot traffic could degrade lesser long-nosed bat foraging habitat. As described in the "Wilderness Stewardship" portion of the "Proposed Action", CPNWR will encourage back-country visitors to hike and administrative trails in order to concentrate user impacts on already affected areas; if successful, this will assist in minimizing impacts to lesser long-nosed bat habitat. Implementing the Leave-No-Trace program should also help minimize degradation of lesser long-nosed bat habitat by visitors.

Use of Stock Animals

Allowing recreational activities involving pack and saddle stock on the CPNWR may result in degradation of lesser long-nosed bat habitat (i.e., stock could introduce non-native species, cause erosion, etc.). The seven stock-related restrictions (i.e., no grazing on CPNWR; restrictions in

size of groups and allowed use areas, etc.), however, will minimize potential adverse impacts to lesser long-nosed bats from stock associated activities.

Hunting

Allowing hunting of desert bighorn sheep may adversely affect lesser long-nosed bat habitat. Impacts to lesser long-nosed bat habitat from hunting will generally be similar to those described under "Motorized" and "Non-motorized Recreational Use" and "Use of Stock Animals" because hunters must access the allowable hunting areas by foot, vehicle, or stock animal. Hunting activities will not result in disturbance to lesser long-nosed bats, however, because the desert bighorn sheep hunting season (December) and the period during which lesser long-nosed bats use the action area (spring and summer) do not overlap.

Lesser long-nosed bat habitat could also be degraded if CPNWR allows hunting of game and predator species in the future. Additionally, if predator and game hunts are allowed in the spring or summer, lesser long-nosed bats could be disturbed by activities associated with hunting (lights and noise at night). The expanded hunting program would be subject, however, to further Intra-Service section 7 consultation.

Educational and Interpretive Services

Participating and providing educational and interpretive services will generally benefit lesser long-nosed bats if they result in heightened public awareness of and sensitivity toward the species. Depending on the placement of the potential loop road in Childs Valley (i.e., near columnar cacti or agave), lesser long-nosed bat habitat could be impacted if the road is developed. Development of the loop road would however be subject to further Intra-Service section 7 consultation.

Issues Covered by Existing Policy, Law, or Regulations

Border Law Enforcement

The effects of border law enforcement on bats are discussed above.

Fire Management

Fire suppression activities may adversely affect lesser long-nosed bats in a various ways (i.e., nighttime presence of fire crews could disturb foraging bats; fire crew vehicles and fire suppression activities, like creating fuel breaks, could degrade bats habitat; etc.), however, all suppression activities that may affect bats, once conducted, are subject to emergency section 7 consultation procedures. Fire suppression will benefit lesser long-nosed bats if it prevents further destruction (burning) of bat habitat. Any future CPNWR fire management plan will be subject to further section 7 consultation.

Trespass Livestock and Pets

The effects on lesser long-nosed bats from the removal of trespass livestock are discussed above. Pets could disturb bats if they entered the Bluebird Mine. The requirement that pets must be leashed and under the control of the owner in addition to the presence of the fence around the mine should prevent mine entrance by pets.

CUMULATIVE EFFECTS

Lesser Long-Nosed Bat

Most lands within the action area are managed by Federal agencies; thus, most activities that could potentially affect bats are Federal activities that are subject to section 7 consultation. The effects of these Federal activities are not considered cumulative effects. However, a portion of the action area also occurs on TON lands, on private lands in the U.S., and in Mexico. Residential and commercial development, farming, livestock grazing, surface mining and other activities occur on these lands and are expected to continue into the foreseeable future. These actions, the effects of which are considered cumulative, may result in small-scale loss or degradation of lesser long-nosed bat foraging habitat, and potential disturbance of roosts. Illegal immigrant/smuggler activities, described above under "Cumulative Effects" for pronghorn, can result in loss or degradation of potential lesser long-nosed bat foraging habitat (impacts to foraging habitat have not been quantified however) and disturbance to and abandonment of roosts, as has been documented at the Bluebird Mine roost site. Though immigrant/smuggler activity has increased dramatically in recent years in Arizona, lesser long-nose bat populations appear to be increasing or stable at many roost sites within and outside the action area.

CONCLUSION

Lesser Long-Nosed Bat

After reviewing the current status of the lesser long-nosed bat, the environmental baseline for the action area, the effects of the proposed activities associated with implementation of the CCP, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the lesser long-nosed bat. No critical habitat has been designated for this species, therefore, none will be affected. Our conclusion is based on the following:

1. Lesser long-nosed bat populations appear to be increasing or stable at many roost sites in Arizona and Mexico.

2. The project will not directly affect any known bat roosts (Copper Mountain Mine, and Pinacate Cave) in the action area except Bluebird Mine. Maintaining fencing around the Bluebird Mine will directly affect the roost, but this should benefit lesser long-nosed bats. The proposed placement of a bat-friendly gate would, if implemented, directly affect the Bluebird Mine roost; however, this action will undergo further section 7 consultation.

3. The CCP does not authorize the direct removal or destruction of lesser long-nosed bat forage resources.

4. Restrictions, prohibitions, and provisions described in the proposed action (e.g., the eastern three-quarters of the CPNWR will be seasonally closed to public access generally from March 15 to July 15, no stock animal grazing, restricting recreational vehicle access

to non-wilderness travel corridors and access roads only, etc.) will minimize adverse effects to lesser long-nosed bats from certain activities proposed by the CCP.

5. Conservation and recovery activities for the lesser long-nosed bat (e.g., restricting access to and maintaining fencing at Bluebird Mine) included in the proposed action will help protect lesser long-nosed bats at the Bluebird Mine from possible human disturbance (related to implementation of the CCP or other proposed actions such as CBP/OBP's installation of the PVB along the CPNWR). The net effect to the lesser long-nosed bat from implementation of the CCP will be beneficial.

The conclusions of this biological opinion are based on full implementation of the project as described in the "Description of the Proposed Action" section of this document, including any conservation measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3). "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Lesser Long-Nosed Bat

We do not anticipate the proposed action will result in incidental take of lesser long-nosed bat for the following reasons:

1. Implementation of some CCP activities will directly affect the Bluebird Mine lesser long-nosed bat roost site, however, these activities should benefit lesser long-nosed bats.

2. Implementation of the CCP will not result in the direct removal or destruction of bat foraging habitat.

3. Protective measures at the Bluebird Mine roost site will help prevent human disturbance of lesser long-nosed bats at the site.

4. No incidental take of lesser long-nosed bats is known to have occurred on the CPNWR or elsewhere in Arizona due to activities authorized by the CCP.

5. Specific proposals for a bat gate at Bluebird Mine will be evaluated in future consultation, including potential for incidental take.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend implementing the following actions:

1. Continue to implement recovery and conservation actions for Sonoran pronghorn and lesser long-nosed bats.

2. Develop a fire management plan for the CPNWR in conjunction with our office as well as the MCAS, LAFB, BLM, and OPCNM.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in this biological opinion. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation and assistance throughout this consultation process, as well as your considerable role and leadership in conservation of the Sonoran pronghorn and other important natural resources. Any questions or comments should be directed to Erin Fernandez (520) 670-6150 (x238) or Jim Rorabaugh (602) 242-0210 (x238).

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Yuma, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ
Superintendent, Organ Pipe Cactus National Monument, Ajo, Arizona
Director, 56th Range Management Office, Luke Air Force Base, Gila Bend, AZ
Director, Range Management Department, Marine Corps Air Station, Yuma, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Chairperson, Tohono O'Odham Nation, Sells, AZ
Bureau of Indian Affairs, Phoenix Area Office, Phoenix, AZ

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TABLES AND FIGURES

Table 1. Comparison of U.S. Sonoran pronghorn population surveys, 1992-2002.

	Pronghorn observed		Population estimates		
Date	On transect	Total observed	Density estimate using DISTANCE (95 percent CI[a])	Lincoln-Peterson (95 percent CI)	Sightability model (95 percent CI)
Dec 92	99	121	246 (103-584)	---	179 (145-234)
Mar 94	100	109	184 (100-334)	---	282 (205-489)
Dec 96	71	82 (95[b])	216 (82-579)	162 (4-324)	130 (114-154)
Dec 98	74	86 (98[b])	---	172 (23-321)	142 (125-167)
Dec 00	67	69[b]	---	---	99 (69-392)
Dec 02	18	0	---	---	21 (18-33)[c]

[a] Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

[b] Includes animals missed on survey, but located using radio telemetry.

[C] Jill Bright, Arizona Game and Fish Department, pers. comm. 2003

Figure 1. Cabeza Prieta National Wildlife Refuge (WFEIS, June 2006)

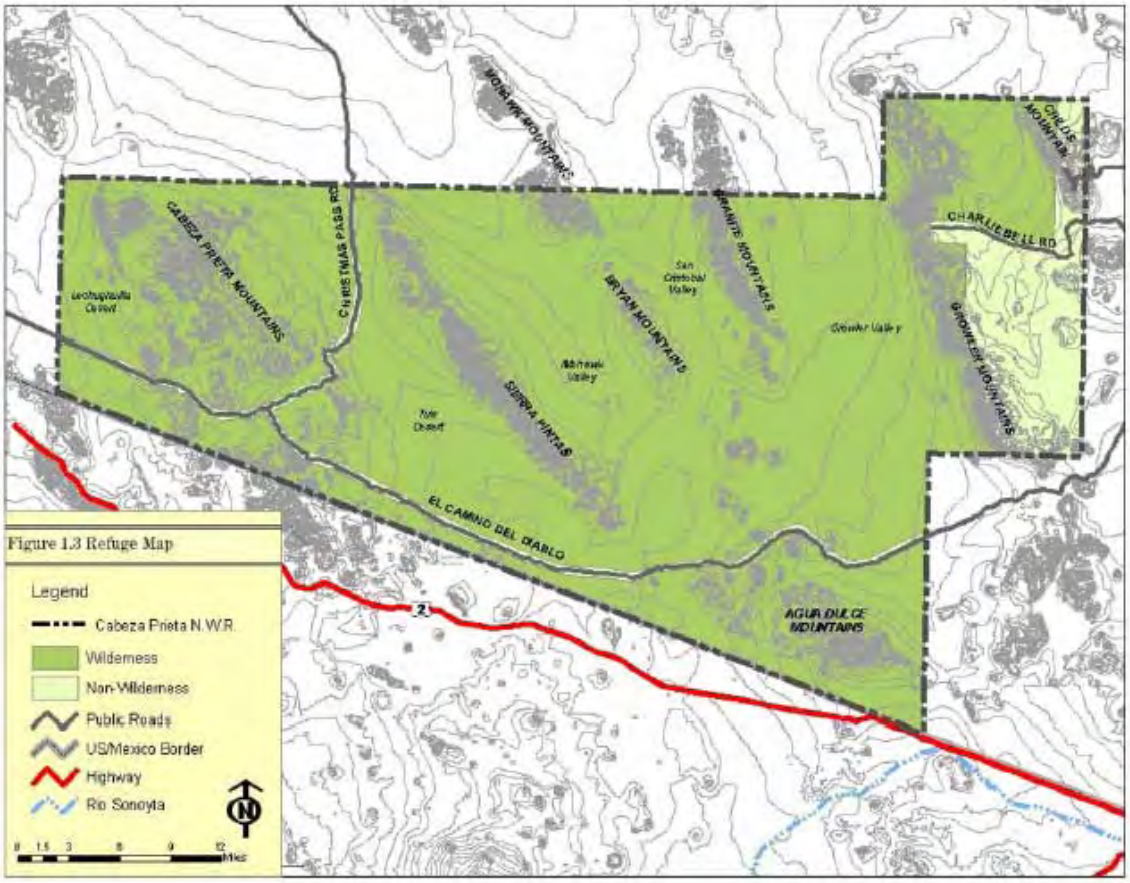
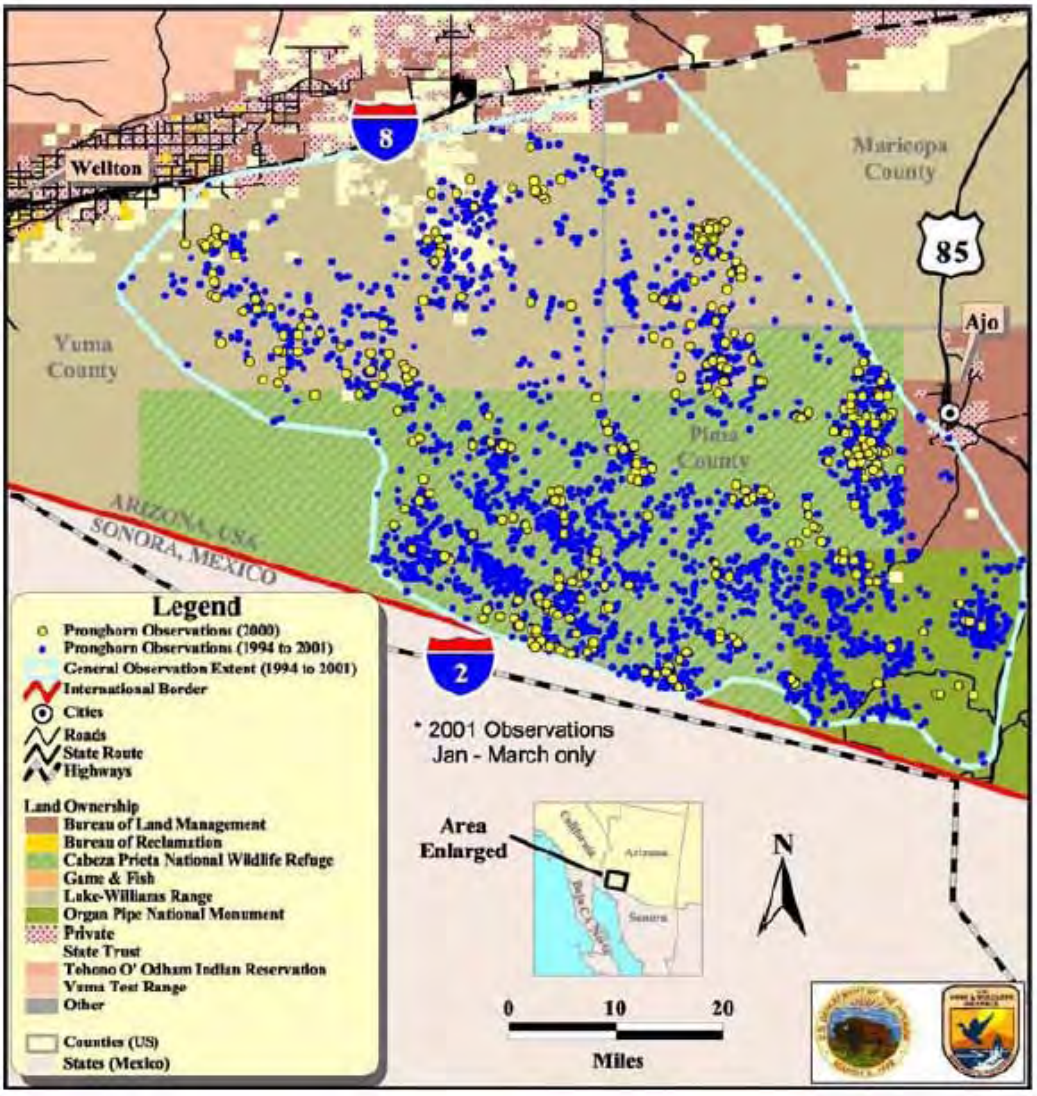


Figure 2. Historic range of Sonoran pronghorn in the Unites States and Mexico.

Figure 3. Current Sonoran pronghorn distribution in the United State: Records from 1994-2001.



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