

DRAFT

**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**

**U.S. Fish and Wildlife Service
Region 2, Albuquerque, New Mexico**

Approved: XXX
Regional Director, U.S. Fish and Wildlife Service

Date: _____

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ACRONYMS AND ABBREVIATIONS

AGFD	Arizona Game and Fish Department
BEC	Barry M. Goldwater Executive Council
BLM	Bureau of Land Management
BMGR	Barry M. Goldwater Range
Court	U. S. District Court
CPNWR	Cabeza Prieta National Wildlife Refuge
El Pinacate	El Pinacate y Gran Desierto de Altar Biosphere Reserve
EHD	Epizootic Hemorrhagic Disease
EOD	Explosive Ordnance Disposal
ESA	Endangered Species Act
IMADES	Instituto del Medio Ambiente y el Desarrollo Sustentable de Estado de Sonora
MCWRU	Montana Cooperative Wildlife Research Unit
NPS	National Park Service
OPCNM	Organ Pipe Cactus National Monument
PVA	Population Viability Analysis
Recovery Plan	Final Revised Sonoran Pronghorn Recovery Plan
RT	Recovery Team
UA	University of Arizona
UDM	Undocumented Migrant
USAF	U. S. Air Force
USBP	U. S. Border Patrol
USFWS	U. S. Fish and Wildlife Service
USMC	U. S. Marine Corps
WTI	Weapons and Tactics Instructor Course

EXECUTIVE SUMMARY

This document supplements and amends the Final Revised Sonoran Pronghorn Recovery Plan (Recovery Plan) (USFWS 1998) in response to a court-ordered remand (Federal District Court, Washington, D.C., 12 April 2001) to the U.S. Fish and Wildlife Service (USFWS) to reassess and incorporate Sonoran pronghorn (*Antilocapra americana sonoriensis*) recovery criteria and to incorporate objective measurable criteria for the delisting of the pronghorn, and provide estimates of time required to carry out those measures needed to achieve the plan's goal and intermediate steps toward that goal. This amendment updates selected sections of the Recovery Plan to ensure that the best and most current data available are considered. Accordingly, updates on recent Sonoran pronghorn population surveys in the United States and Mexico, mortality investigations, disease testing, and the effects of military overflights on behavior and hearing are presented.

In addition, the discussion of recovery criteria is prefaced by an assessment of the five factors that must be considered when determining if a species meets the requirements for listing as threatened or endangered under the Endangered Species Act (ESA) of 1973. The Sonoran pronghorn was initially designated endangered in 1967 under the Endangered Species Preservation Act of 1966. The subspecies was "grandfathered" in under the ESA, and as a consequence, formal listing factors were never established. The five factors described in section 4(a)(1) of the ESA are: 1) the present or threatened destruction, modification, or curtailment of its habitat or range; 2) overutilization for commercial, sporting, scientific, or educational

purposes; 3) disease or predation; 4) the inadequacy of existing regulatory mechanisms; and 5) other natural or manmade factors affecting its continued existence. A discussion of the five factors is presented in this amendment to the Recovery Plan.

Also, recovery criteria established in the Recovery Plan for downlisting/delisting are reassessed and discussed. The criteria for downlisting remain valid and achievable. Specified recovery efforts are applied to the appropriate listing factors outlined on page 22 of the Court Order. The USFWS believes these recovery efforts will in the short-term lead to downlisting the Sonoran pronghorn from endangered to threatened, and in the long-term , will contribute to the delisting of the species.

Finally, the implementation table presented in the Recovery Plan is expanded to include a breakdown of all recovery actions. The table has been updated to provide estimates of time necessary to carry out measures needed to effect recovery of Sonoran pronghorn as articulated in the Recovery Plan.

INTRODUCTION

In response to a lawsuit by the Defenders of Wildlife, et al., (Civil Action No. 99-927 [ESH]), Judge Ellen Huvelle of the United States District Court (Court) for the District of Columbia issued a Memorandum Opinion and Order on February 12, 2001 that ruled (in part):

“...that the Fish and Wildlife Service has acted in a manner that is arbitrary and capricious and contrary to law by issuing a Recovery Plan that fails 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.”

The Order also stated:

“... this matter is remanded to the Fish and Wildlife Service, which has 120 days from the date of this Order to reconsider those portions of the December 1998 Final Revised Sonoran Pronghorn Recovery Plan that have been found to be contrary to the dictates of the Endangered Species Act.”

On April 12, 2001, the deadline for completion of this task was extended by the Court to November 16, 2001.

Additional data on various aspects of Sonoran pronghorn (*Antilocapra americana sonoriensis*) biology have been collected since completion of the Final Revised Sonoran Pronghorn Recovery Plan (Recovery Plan) (U. S. Fish and Wildlife Service [USFWS] 1998). Accordingly, the objectives of this supplement and amendment are to: 1) update selected sections of the Recovery

Plan (USFWS 1998) to ensure that the best and most current data available are considered; 2) address the five listing/“delisting” factors mandated by the Endangered Species Act (ESA); 3) reassess recovery criteria presented in the Recovery Plan (USFWS 1998) in relation to these five factors; and 4) where practicable, provide estimates of time necessary to carry out measures needed to effect recovery of Sonoran pronghorn as articulated in the Recovery Plan (USFWS 1998).

1. Sonoran Pronghorn Biology Update

U. S. population surveys - Sonoran pronghorn in the U. S. were surveyed biennially from 1992 to 2000 (Bright et al. 1999; J. L. Bright et al., Arizona Game and Fish Department [AGFD] unpubl. data) by the AGFD and cooperating Federal land management agencies using aerial line transects (Johnson et al. 1991). The AGFD derived population estimates using three estimators: DISTANCE, Lincoln-Peterson Index, and a sightability model. From 1992 to 1996, DISTANCE (Laake et al. 1993), a computer software statistical program, was used to estimate population based on density. However, the coefficient of variation was unacceptably high, and an alternative estimator was sought (Bright et al. 1999). From 1996 to 1998, the agencies used the Lincoln-Peterson Index, a mark-and-recapture method, as a population estimator (Davis and Winstead 1980). This technique is biased towards larger groups of animals and overestimates populations (McCullough and Hirth 1988, Estes and Jameson 1988). In 1998, a group size adjusted estimator (i.e., sightability model) (Samuel and Pollock 1981) was used to correct for inherent bias in the Lincoln-Peterson Index (Bright et al. 1999). This involved calculating

sighting rates by group size using Sonoran pronghorn groups with radiocollared animals that were observed or missed during previous surveys. This estimator corrects for group size bias and is more conservative than the Lincoln-Peterson Index (Bright et al. 1999). Furthermore, the low coefficient of variation for the sightability model suggests it is a more precise descriptor of the relationship between group size and observation rate. For these reasons, the sightability model is the better estimator of the three used and is the current method of choice for calculating Sonoran pronghorn population size. Population estimates were subsequently calculated for all survey years, 1992-2000, using the sightability model (Table 1) (Bright et al. 1999; J. L. Bright et al., AGFD, unpubl. data). With the exception of 1994, the sightability model shows a downward population trend from 1992 to 2000. The 1994 estimate may be inflated due to inconsistent survey timing. The decline in numbers from 1992 to 2000 is supported by other survey data including high adult mortality, low fawn survival and recruitment, and smaller average herd sizes (J. J. Hervert, AGFD, unpubl. data).

Table 1. Comparison of U.S. Sonoran pronghorn population surveys, 1992-2000.

Date	Pronghorn observed		Population estimate		
	On transect	Total observed	Density estimate using DISTANCE (95% CI)	Lincoln-Petersen (95% CI)	Sightability model (95% CI)
Dec 1992	99	121	246 (103-584)	n/a	179 (145-234)
Mar 1994	100	109	184 (100-334)	n/a	282 (205-489)
Dec 1996	71	82 (95 ¹)	216 (82-579)	164 (4-324)	130 (114-154)
Dec 1998	74	86 (98 ¹)	n/a	172 (23-321)	142 (125-167)
Dec 2000	67	69 ¹	n/a	n/a	99 (69-392)

¹ including animals missed on survey, but located using radiotelemetry.

Mexico population surveys - Suitable habitat within the current known range of Sonoran pronghorn in Mexico was surveyed in March 1993 (Snow 1994) and December 2000 (J. L. Bright et al., AGFD, unpubl. data). Population estimates for both years were determined using the sightability model (Bright et al. 1999) (Table 2).

Table 2. Comparison of Sonoran pronghorn surveys in Mexico, 1993 and 2000.

	Total number of pronghorn seen	Sightability model (95% CI)
March 1993		
Southeast of Highway 8	163	289 (226-432)
West of Highway 8	51	124 (91-211)
Total	214	414 (317-644)
December 2000		
Southeast of Highway 8	249	311 (261-397)
West of Highway 8	17	34 (27-48)
Total	266	346 (288-445)

Sonoran pronghorn in Mexico declined approximately 16% (not statistically significant based on overlapping confidence intervals) from 1993 to 2000. This apparent decrease was not experienced equally across pronghorn range. Sonoran pronghorn habitat in Mexico is bisected by Highway 8 (J. L. Bright et al., AGFD, unpubl. data; Fig. 1). It is unknown how complete a barrier Highway 8 is to pronghorn movements. In July 1996, a male pronghorn was found dead on the highway. In addition, anecdotal reports of pronghorn crossing this road are occasionally received from travelers to and from Puerto Peñasco (J. Bright, AGFD, pers. comm.).

Conversely, no radiocollared pronghorn were known to cross the road during a study conducted in the 1990s (R. Paredes, Instituto del Medio Ambiente y el Desarrollo Sustentable de Estadio de

Sonora [IMADES], pers. comm.). The subpopulation southeast of Highway 8 remained stable or even increased slightly between 1993 and 2000. Forage conditions in 2000 were better in this area than the rest of Sonoran pronghorn range in Mexico and the U.S. (J. L. Bright et al., AGFD, unpubl. data). The subpopulation west of Highway 8 ranges throughout pronghorn habitat on the El Pinacate y Gran Desierto de Altar Biosphere Reserve (El Pinacate) and surrounding buffer areas, and is adjacent to the U.S. subpopulation (Fig. 1). Mexico Highway 2 (and to a lesser extent the international boundary fence) acts as a barrier to movement between the El Pinacate and U.S. subpopulations. The El Pinacate subpopulation declined significantly (based on non-overlapping confidence intervals) between 1993 and 2000 (Table 2). Recurring drought and associated poor forage conditions, likely exacerbated by extensive livestock grazing, may have figured prominently in the significant decline observed in the El Pinacate subpopulation. Loss of the El Pinacate subpopulation would result in further fragmentation and isolation of the remaining Sonoran pronghorn subpopulations in the U. S. and Mexico.

Mexican biologists from IMADES and El Pinacate are active members of the Sonoran pronghorn recovery team. Survey results and management issues in Mexico are closely coordinated with their U.S. counterparts. Pronghorn status and recovery options in the U.S. cannot be fully addressed without some consideration of pronghorn status in Mexico. For example, loss of the U.S. subpopulation can not be rationalized as acceptable simply because two subpopulations remain extant in Mexico and a reintroduction from Mexico to the U.S. is a perceived option. The Sonoran pronghorn is classified as endangered by the Mexican

government (R. Paredes, IMADES, pers. comm.) and the future of Mexico's two subpopulations is far from secure. Herd status and habitat conditions are not monitored in Mexico as closely as they are in the U.S. Sonoran pronghorn habitat southeast of Mexico Highway 8 is privately owned and while current numbers appear stable (Table 2), livestock grazing and poaching (R. Paredes, IMADES, pers. comm.) need to be considered for the long-term health and stability of this subpopulation. In addition, this area is threatened by encroachment from agriculture and residential developments, and fragmentation from mining and road building (J. J. Hervert, AGFD, pers. comm.).

Pronghorn mortalities - Thirty-five adult Sonoran pronghorn have been captured and radio-collared since 1994; 22 in 1994, nine in 1997/98, and four in 2000. Twenty-two of the 35 collared animals (63%) have since died. Four additional uncollared adult mortalities were documented during this same period (Hervert et al. 2000; AGFD files, Region IV, Yuma, Arizona; Cabeza Prieta National Wildlife Refuge [CPNWR] files, Ajo, Arizona).

Five pronghorn captured in 1994 died within 1-33 days post-capture. Three of these mortalities were from unknown causes, while two appeared predator-related (mountain lion [*Puma concolor*] and coyote [*Canis latrans*]). Since it is unusual to have this many animals die within 40 days post-capture, the direct or indirect effects of capture myopathy (Beheler-Amass et al. 1998), was a suspected factor in their deaths (Hervert et al. 2000). Capture myopathy is a physiological condition of an animal, caused by fear and stress, that sometimes manifests itself

during capture. Left untreated, the effects of capture myopathy can range from temporary debilitation to death. Capture and handling procedures were immediately modified and no subsequent losses related to capture myopathy have occurred. (J. J. Hervert, AGFD, pers. comm.). A sixth animal died from a broken neck caused by capture operations in December 2000.

Of the 20 remaining documented mortalities since 1994, nine (45%) were directly attributable to predation (i.e., five coyote, two bobcat [*Lynx rufus*], one mountain lion, and one unknown), and 11 (55%) were from unknown causes. When investigating a Sonoran pronghorn mortality, cause of death was ascertained using whatever forensic evidence was present at the scene (e.g., tracks of a predator chasing a pronghorn, multiple knock-down sites, broken branches and disturbed soils from thrashing). Some of the 11 mortalities attributed to unknown causes were likely caused by predation (J. J. Hervert, AGFD, pers. comm.), however, unavoidable lags between time of death and scene investigation caused available evidence to sometimes be obscured by weather and scavengers. In summary, this level of predator-related adult mortality is high given the current low numbers of Sonoran pronghorn in the U. S., and could pose serious problems for the eventual recovery, or for that matter continued maintenance, of this subpopulation without active predator control.

Pronghorn and disease - Blood samples from five Sonoran pronghorn captured in December 2000 were evaluated by the Arizona Veterinary Diagnostic Lab at the University of Arizona (UA) for evidence of epizootics. All five samples tested positive for bluetongue and epizootic hemorrhagic disease (EHD) (one sample tested “weak” positive); two potentially fatal diseases that may afflict pronghorn. These findings were consistent with serological examinations performed on Sonoran pronghorn from earlier capture operations (AGFD unpubl. data). Bluetongue is carried by cattle and is one of the most serious diseases affecting pronghorn (Yoakum et al. 1996, Yoakum and O’Gara 2000). Epizootic hemorrhagic disease is similar to and not readily distinguishable from bluetongue, and occurs in pronghorn (Merck & Company 1979, Jessup and Boyce 1996). Arizona pronghorn populations, in general, exhibit a high exposure rate to bluetongue (Heffelfinger et al. 1999). No Sonoran pronghorn have been captured or observed (including mortality investigations) with any obvious clinical signs of disease (J. J. Hervert, AGFD, pers. comm.).

The biting midge (*Culicoides* spp.) is a suspected vector in the transmission of bluetongue and EHD to Sonoran pronghorn. This insect breeds in damp or watery habitats, a condition that may only exist in Sonoran pronghorn habitat around some wildlife waters or in wet years when water persists in playas and other natural collection basins for extended periods. The AGFD is currently attempting to collect biting midges from Sonoran pronghorn range for disease testing (J. J. Hervert, AGFD, pers. comm.).

Military overflights - The level of military flights over most of the Sonoran pronghorn range in the U.S. has raised concerns about their potential effects on Sonoran pronghorn (Krausman et al. 2001, USFWS 1998). Possible direct effects of military overflights on Sonoran pronghorn include death or injury from ordnance delivery, live rounds, and aircraft mishaps; possible indirect effects include influences on behavior or physiology (USFWS 1997). However, empirical data have not provided evidence of these threats.

A modeling exercise was conducted to estimate the likelihood of military aircraft flying over Sonoran pronghorn during low altitude sorties (Robinson et al. 2000). Flight paths were simulated within nine existing flight corridors over the Barry M. Goldwater Range (BMGR) and CPNWR, using both known (March and October) and randomly generated Sonoran pronghorn locations that were stratified by habitat. It was concluded that the probability of low-flying military aircraft encountering Sonoran pronghorn in training routes and the number of pronghorn encountered differed seasonally and among corridors. Few Sonoran pronghorn would likely be encountered until flight strip widths were >0.8 km. This ranged from one to 11 encounters (grand mean for March and October actual location data) for flight strip widths of 0.8 to 6.4 km, respectively. Habitat use patterns coupled with known Sonoran pronghorn location data has potential in identifying flight corridors that minimize the probability of encounters (Robinson et al. 2000).

A three-year study of the effects of noise from military overflights on Sonoran pronghorn on the BMGR was recently completed (Krausman et al. 2001). The objective of the study was to determine if noise from military activities on BMGR's tactical ranges influenced Sonoran pronghorn behavior and hearing. American pronghorn (*A. a. americana*) and desert mule deer (*Odocoileus hemionus eremicus*) hearing was tested during this study and compared with known hearing data from desert bighorn sheep (*Ovis canadensis*) (Weisenberger et al. 1996, Krausman et al. 1998) and humans. Noise levels from military activity on BMGR did not influence Sonoran pronghorn hearing, and in fact, pronghorn appeared to have habituated to most military activities. While military activity was associated with occasional changes in pronghorn behavior, these changes likely did not significantly effect the animals (Krausman et al. 2001).

2. Reasons For Listing

The Sonoran pronghorn was determined to be an endangered species on 11 March 1967 (32 FR 4001). This determination was made in accordance with the Endangered Species Preservation Act of 15 October 1966, which pre-dated the ESA by more than six years. Section 4(c)(3) of the ESA provides that:

“(A)ny list in effect on the day before the date of the enactment of this Act of species of fish or wildlife determined by the Secretary of the Interior, pursuant to the Endangered Species Conservation Act of 1969, to be threatened with extinction shall be republished to conform to the classification for endangered species or threatened species, as the case may be, provided for in this Act, but until such republication, any such species so listed shall be deemed an endangered species within the meaning of this Act. The republication of any species pursuant to this paragraph shall not

require public hearing or comment under section 553 of title 5, United States Code.”

Section 4(a)(1) of the ESA lists five factors that must be considered when determining if a species should be designated as threatened or endangered. As a consequence of the “grandfather” clause [Section 4(c)(3)] in the ESA, formal listing factors were never established or required for Sonoran pronghorn to be listed under the ESA. Regardless, these same five factors must also be considered when determining if a species qualifies for delisting. The purpose of this section is to provide this documentation. The five factors as they apply to Sonoran pronghorn are discussed below and have been taken into account in the development of the recovery efforts (Section 3. Recovery Criteria) and implementation schedule (Section 4. Updated Implementation Schedule).

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The pronghorn is a unique wild ruminant, endemic to North America, and adapted to a wide range of climatic conditions (Yoakum and O’Gara 2000). The Sonoran race 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). Although probably never abundant (Yoakum and O’Gara 2000), 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 (Carr 1971). 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 in search of sustenance. Unfortunately, Sonoran pronghorn have been extirpated from much of their historic habitat in the U. S. and Mexico (USFWS 1998), and currently occupy <10% of their suspected former range (J. Hervert, AGFD, unpubl. data) (Fig. 1 and 2).

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 >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 Organ Pipe Cactus National Monument (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).

Livestock grazing on lands administered by the Bureau of Land Management (BLM) continues on a small portion of currently occupied Sonoran pronghorn habitat around Ajo, Arizona. The BLM is in the process of performing allotment analyses on these areas in terms of their current conditions and ongoing uses to determine if grazing is in compliance with the Arizona standards for rangeland health. If current grazing practices prove to be a factor in these areas not meeting established standards, the BLM must adjust grazing through the permitting process to ensure significant progress is made towards achieving standards (T. Hughes, BLM, pers. comm.).

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, the International Boundary), railroads, and canals have caused habitat fragmentation.

The single U.S. subpopulation of Sonoran pronghorn is segregated from Mexico by an incomplete, and often cut or washed out International Boundary fence, and by Mexico Highway 2 (Fig. 1). Current plans by the Mexican government include upgrading Highway 2 into a four-lane divided highway (R. Paredes, IMADES, pers. comm.). The two Mexican subpopulations are separated by Mexico Highway 8. Traffic on Highway 8 continues to grow with the increased marketing of Puerto Peñasco as a tourist destination. Fortunately, most of the presently occupied habitat in the U. S. is administered by the USFWS, National Park Service (NPS), Department of Defense, or BLM. There are a few hectares of patented mining claims in pronghorn habitat in the U.S. The size and degraded habitat conditions of occupied range in the U.S. may no longer be adequate to provide all of the critical life needs for Sonoran pronghorn in all years without active management.

B. Overutilization for commercial, sporting, scientific, or educational purposes.

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; OPCNM 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).

A maximum of six Sonoran pronghorn have potentially been lost as a result of capture operations in the U.S. since 1994 when the pronghorn population was 282 animals. At least two of these were taken by predators (a mountain lion and a coyote), with direct or indirect effects of capture myopathy suspected in their deaths (Hervert et al. 2000). Finally, there are no known Sonoran pronghorn maintained in captivity at this time nor has this subspecies been routinely maintained in captivity in the past.

C. Disease or predation.

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. Serological examination revealed a nearly 100% incidence of exposure to bluetongue and 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 is 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. 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).

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 by past grazing practices so that the current population is depressed. 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 ≤ 3 weeks of age are most susceptible to loss from predators (O’Gara and Yoakum 1992). Adult American pronghorn (*A. a. americana*) 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 sympatric with Sonoran pronghorn. In 20 mortality investigations not related to capture operations, coyotes killed at least five 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 1-2 weeks later located the female, but only one or no fawns (AGFD Sonoran pronghorn weekly radio telemetry forms, 1994-2001). Mountain lions in southwest Arizona prey mostly on mule deer (Cashman et al. 1992) but may kill pronghorn when they use rugged terrain (Ockenfels 1994). One adult Sonoran pronghorn was killed by a mountain lion. The ambush site was located in a small desert wash with trees that served as cover (L. Piest, AGFD, pers. comm.). Finally, two adult Sonoran pronghorn were killed by bobcats. The actual number of adult Sonoran pronghorn killed by predators would likely be higher if cause could accurately be assigned in the deaths of 12 other animals.

D. The inadequacy of existing regulatory mechanisms.

The Sonoran pronghorn has been federally protected since 1967. Pursuant to the ESA, it is unlawful to import or export, take, possess, or sell any endangered or threatened species. Permits have been authorized under the authority of the ESA for certain scientific, management, or incidental take purposes. The policy of the State of Arizona is to protect and preserve all native species (and their habitat) that are threatened by extinction or are experiencing a significant decline that, if not halted, would lead to a threatened or endangered designation.

According to Arizona state law (A.R.S. 17-314) anyone convicted of unlawfully wounding or killing, or unlawfully possessing an endangered species of wildlife may be subject to civil action by the Arizona Game and Fish Commission in the form of license revocation and/or recovery of a minimum sum (currently \$2,131.19). Hunting license privileges can be revoked by the Commission for up to five years upon conviction (A.R.S. 17-340).

Critical habitat for Sonoran pronghorn has not been designated. Current Sonoran pronghorn range in the U.S. is almost entirely encompassed by lands under federal jurisdiction. Involved federal lands include CPNWR administered by the USFWS, OPCNM administered by the NPS, BMGR administered by the U. S. Air Force (USAF) and U. S. Marine Corps (USMC), and public lands administered by the BLM. All agencies either have in place (NPS 1994, 1997; BLM 1988), or are actively working on comprehensive management plans (e.g., CPNWR Comprehensive Conservation Plan; BMGR Integrated Natural Resources Management Plan) designed to guide management of natural resources on the affected lands for the next 10 to 25 years. All of these plans either do or will address Sonoran pronghorn issues. The USAF and USMC are poised to assume responsibilities from BLM in November 2001 for natural resource management on BMGR. In the interim, natural resource management on the range continues under the guidance provided by the Goldwater Amendment to BLM's Lower Gila South Resource Management Plan (BLM 1990).

Section 7(a)(2) of the ESA states that each federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. In fulfilling these requirements, each agency is to use the best data available. The ESA requires action agencies to consult or confer with the USFWS when there is discretionary federal involvement or control over an action. Formal consultation would become necessary when the action agency requests consultation after determining a proposed action may affect Sonoran pronghorn. However, if the USFWS concurs in writing that a proposed action is not likely to adversely affect pronghorn (i.e., the effects are completely beneficial, insignificant, or discountable), then formal consultation is not required. Formal consultation is also required if the USFWS, through informal consultation, does not concur with the action agency's finding that a proposed action is not likely to adversely affect Sonoran pronghorn.

All applicable federal, state, and county laws, regulations, and ordinances are enforced on the various federal properties by their respective law enforcement branches, County Sheriff Departments, and AGFD. In addition, the U.S. Border Patrol (BP), Drug Enforcement Administration, and U.S. Customs Service are empowered with patrolling the U.S./Mexico border and enforcing federal laws covering, in part, smuggling and illegal entry to the U.S. by undocumented migrants (UDM). Most of the BMGR is closed to all public access. Each visitor to CPNWR and the open portions of BMGR must obtain a permit and sign a hold harmless agreement prior to entry. Visitors to CPNWR and BMGR are required to check in prior to entry

by placing a toll-free call. Visitors to OPCNM are required to have a permit to access or camp in the back country. No permit is required to access BLM lands, however, vehicle travel is restricted to existing roads and trails and is limited to 14 days per group.

Existing regulatory mechanisms appear adequate to minimize effects of illegal anthropogenic actions on Sonoran pronghorn in currently occupied habitat in the U.S. However, the capabilities of the various law enforcement entities in the region can be overwhelmed by the logistics of patrolling such a vast and isolated area, compounded by staffing and funding limitations, changing agency priorities, and a growing UDM and smuggling problem that is overtaxing court dockets. There is a general lack of legal mechanisms for the USFWS to prosecute UDMs caught trespassing on refuge lands. Unless there is evidence of chronic repeat violations or other illegal activities such as drug smuggling, the BP typically processes UDMs and returns them to Mexico.

E. Other natural or manmade factors affecting its continued existence.

Sonoran pronghorn numbers in the U.S. are critically small with only 99 pronghorn (Table 1). Interaction between the U.S. subpopulation and the two known subpopulations from northern Sonora, Mexico is unlikely. The U.S. subpopulation of Sonoran pronghorn is vulnerable to extinction from threats associated with small population size, naturally occurring events, and other disturbances.

The number of pronghorn in currently occupied habitat in the U.S. is 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).

Other factors that have the potential to directly contribute to Sonoran pronghorn mortality are highways, railroads, and canals. In June 1996, a dead, radiocollared pronghorn was located approximately 400 m 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 (the animal ran west off the right-of-way at the vehicle's approach) on the north end of the Crater Range in June 1996 (R. Barry, USAF, pers. comm.), contemporary 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 radiocollar 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 Wellton-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 second largest terrestrial aerial gunnery training range and has been used for developing and maintaining the combat readiness of the tactical air forces of the military since 1941. Natural resources on the BMGR are managed primarily by the BLM, however, this function is set to revert to the military effective November 2001. The airspace above CPNWR is under the jurisdiction of the USAF. Military activities in pronghorn habitat on and above the BMGR and above CPNWR include such things as airspace use by military 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). 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. 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 overflights, 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 three months. During range clearances, large six-wheeled trucks are driven across the desert at intervals ranging from 15 to 50 m 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) courses twice a year (March-April and October-November). During the five days of a typical WTI course, one flight/day of two to eight helicopters (65 to 100 m apart) traverse CPNWR within established flight corridors from west to east. 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 occurs 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 (USFWS 1997).

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 around the cooler months and unpredictable but popular “wild flower” events that occur in spring and early summer.

Approximately 1/3 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 Defense 2001). Visitation on the USAF portion of BMGR is currently restricted to the Saucedo 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 (860,010 acres or 348,046 hectares) is open to recreational access. A total of 93% 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. Organ Pipe Cactus National Monument (330,689 acres or 133,830 hectares) is entirely open to visitors and is approximately 95% designated Wilderness. Developed facilities for public use include the visitor center near Lukeville, Arizona, one remote primitive camping area, one developed campground, and approximately 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. Camp 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 UDMs 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 km 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 UDM 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 UDMs 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) UDMs 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 (Wellton 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. Customs Service, 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 the U. S. Customs Service and daily helicopter flights by the BP, placement and maintenance of sensors, foot and vehicle patrols, and check stations); roadblocks and hot pursuit chases; detention, arrest, and transport of UDMs 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 UDMs 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.

The recent exposure-related deaths of 14 UDMs (May 2001) on CPNWR and BMGR has increased public awareness of the hazards of crossing the Sonoran Desert on foot (particularly in the hot, dry summer months). Humane Borders, a Tucson, Arizona-based humanitarian organization has proposed placing “water stations” on federal lands throughout the border desert region of southwest Arizona. The hope is that UDMs (and others) that find themselves in trouble in the desert will locate these stations and the loss of life due to high temperatures and thirst will be minimized. The placement of water stations has the potential to increase UDM traffic (particularly for those traveling by foot) through Sonoran pronghorn habitat by those with the knowledge or expectation of finding a source of potable water along their travel route. Maintenance of these water stations would also necessitate additional travel (vehicle and/or foot), weekly or more often depending on UDM use, in pronghorn habitat. The BP has proposed an alternative solution which would involve placement of a series of solar-powered, radio

transmitters that would send a distress signal resulting in the immediate dispatch of rescue forces once a “panic button” was pressed. These radio stations would be strategically placed in areas of high UDM traffic based on frequency of past rescues and deaths. Placement of radio transmitters in Sonoran pronghorn habitat would also increase human presence in these areas (e.g., BP maintenance and rescue crews).

3. Recovery Criteria

The primary recovery objective in the 1982 Sonoran Pronghorn Recovery Plan was to “(M)aintain existing population numbers and distribution of Sonoran pronghorn while developing techniques which will result in a U.S. population of 300 animals (average for a five-year period) or numbers determined feasible for the habitat” (USFWS 1982). Once this population figure was met and major threats eliminated, the species would be considered for delisting (USFWS 1982). The 1982 Recovery Plan also noted that reintroduction into historic habitat may be the only realistic way to achieve the population goal of 300 (USFWS 1982). Little quantitative information on the subspecies or its habitat existed at the time, and this figure was arrived at using the best biological judgment of the recovery team (Ted Cordery, BLM, pers. comm.). A population goal of 300 animals may approach or exceed carrying capacity given current conditions on the occupied range.

Based on new information, the standards for recovery were revised and tightened in the 1998 Recovery Plan. Specifically, for downlisting from endangered to threatened the 1998 Plan requires “...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, numbers...adequate to sustain the population through time (USFWS 1998).” These criteria were based on the results of a PVA (Defenders of Wildlife 1998).

Although new data were available since the 1982 Plan (USFWS 1982), the “Core Working Group” tasked with developing the 1998 Revision determined there were still insufficient data on which to base delisting criteria (Mike Coffeen, USFWS, pers. comm.). On 5 March 2001, a special meeting of the Sonoran Pronghorn Recovery Team was held to discuss those sections of the 1998 Recovery Plan remanded by the Court to the USFWS for reconsideration, and in particular recovery criteria for delisting. After a thorough review of the best available information and considerable discussion, the Recovery Team concluded that given 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, establishing delisting criteria at this time is not practicable. In reality, the Sonoran pronghorn may not be fully recoverable. However, pursuant to court order, specified recovery efforts listed below are applied to the appropriate listing factors outlined on page 22 of the court order. Based upon current research, the USFWS believes these recovery efforts will in the short-term lead to downlisting the Sonoran pronghorn from endangered to threatened, and in the long-term, will 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.

A. Recovery Efforts.

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.

B. Application of Recovery Efforts to the Five Factors to be Considered when Listing, Delisting, or Reclassifying the Species.

1. Factor (A): “the present or threatened destruction, modification, or curtailment of Sonoran pronghorn habitat or range.” The above listed recovery efforts that address this factor include: 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); 4) evaluating potential transplant locations, establishing relocation methodology and protocols, developing interagency agreements (including with Mexico as required), acquiring funding, and initiating reestablishment projects; and 5) increasing frequency and expanding scope of aerial monitoring in Mexico to improve comparability with U. S. surveys. The Draft Sonoran Pronghorn Recovery Plan Implementation Schedule identifies recovery plan tasks and estimates

the duration of each task. Recovery effort 1 and its associated tasks is covered in the Implementation Schedule by tasks 1.1 Fawn recruitment, 1.2 Habitat enhancement, 2.22 Habitat criteria for reintroduction, 2.243 Status and availability of preferred forage, 2.244 Water availability at release sites, and 3.5 Recruitment. Recovery effort 2 and its associated tasks is covered in the Implementation Schedule by tasks 1.52 Investigate preferred habitat, 2.244 Water availability at release sites, 2.413 Monitoring - behavior and habitat use, 3.1 Aerial surveys, 3.2 Infrared aerial surveys, and 3.3 Other surveys. Recovery effort 4 and its associated tasks is covered in the Implementation Schedule by tasks 1.51 Protect present range, 1.53 Investigate range expansion, 1.71 Critical use areas on military lands, 1.74 Maintain updated MOU between military and USFWS, 1.11 Viable population estimates, 2.21 Evaluate reintroduction sites and techniques, 2.22 Habitat criteria for reintroduction, 2.23 Public input into reintroduction, 2.241 Determine predator status at reintroduction sites, 2.242 Fencing needs, 2.243 Status and availability of preferred forage, 2.244 Water availability at release sites, 2.25 Legal aspects of reintroduction, 2.31 Transplant herd dynamics, 2.32 Review capture techniques, 2.33 Transplant holding requirements, 2.34 Transplant protocol, 2.411 Monitoring - acceptable levels of loss/mgmt steps, 2.412 Monitoring - mgmt steps for expected/unexpected threats, and 2.413 Monitoring - behavior and habitat use. Recovery effort 5 and its associated tasks is covered in the Implementation Schedule by tasks 3.1 Aerial surveys, 3.2 Infrared aerial surveys, 3.3 Other surveys, and 3.4 Continue telemetry tracking and assessment of radiomarking goals.

2. Factor (B): “overutilization for commercial, recreational, scientific, or educational

purposes.” This factor is addressed by the above listed recovery effort 7: reducing disturbance at critical times of the year. Recovery effort 7 and its associated tasks is covered in the Implementation Schedule by tasks 1.71 Critical use areas on military lands, 1.72 Annual review of military activities, 1.73 Long-term investigation of military effects on behavior, 1.81 Human disturbance - seasonal closures, 1.103 Notify Refuge of fatalities, 2.412 Monitoring - mgmt steps for expected/unexpected threats.

3. Factor (C): “disease or predation.” The above listed recovery efforts that address this factor include: 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); and 6) investigating potential pronghorn disease vectors. Recovery effort 3 and its associated tasks is covered in the Implementation Schedule by tasks 1.4 Predator investigation, 2.241 Determine predator status at reintroduction sites, and 2.411 Monitoring - acceptable levels of loss/mgmt steps. Recovery effort 6 and its associated tasks is covered in the Implementation Schedule by tasks 1.75 Investigate military contaminants, 1.9 Effects of disease and parasites, 1.101 Update veterinarian contact, and 1.102 Materials for medical situations and specimen salvage.

4. Factor (D): “the inadequacy of existing regulatory mechanisms.” This Supplement and Amendment to the 1998 Final Revised Sonoran Pronghorn Recovery Plan determines that “existing regulatory mechanisms appear adequate to minimize effects of illegal anthropogenic

actions on Sonoran pronghorn in currently occupied habitat in the U.S.” (see analysis on page 23 of this Supplement).

5. Factor (E): “other natural or manmade factors affecting its continued existence.” This factor is addressed by the above listed recovery effort 8: investigating and reducing movement barriers. Recovery effort 8 and its associated tasks is covered in the Implementation Schedule by tasks 1.53 Investigate range expansion, 1.6 Livestock, and 2.242 Fencing needs.

4. Updated Implementation Schedule

The implementation schedule outlined in the Recovery Plan (USFWS 1998) was taken directly from the narrative outline, however, it did not include a complete listing of the lowest “stepped down” tasks. In addition, duration for most of the tasks in the implementation schedule was listed as ongoing. The following amendment to the implementation schedule includes a complete listing of all tasks and provides specific durations.

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Draft Sonoran Pronghorn Recovery Plan Implementation Schedule

Priority	Task	Task Description	Task Duration	Responsible Party	Cost Estimate (in thousands)			Comments
					2002	2003	2004	
1	1.1	Fawn recruitment	15 years	USAF, USFWS, USMC	30.0	30.0	30.0	
1	1.2	Habitat enhancement	10 years	USAF, USFWS, USMC	150.0	150.0	150.0	
1	1.3	Water investigation	10 years	USAF, USFWS, USMC	50.0	50.0	50.0	
1	1.4	Predator investigation	5 years	USAF, USFWS, USMC	40.0	40.0	40.0	
1	1.51	Protect present range	ongoing	BLM, NPS, USAF, USFWS, USMC	-	-	-	part of ongoing agency programs
1	1.52	Investigate preferred habitat	5 years	AGFD, BLM, USFWS	20.0	50.0	50.0	
1	1.53	Investigate range expansion	5 years	AGFD, BLM, NPS, USAF, USFWS, USMC	-	-	-	cost estimates included in task 1.52
1	1.6	Livestock	5 years	BLM, USFWS	50.0	50.0	50.0	
1	1.71	Critical use areas on military lands	5 years	AGFD, USAF, USMC	50.0	50.0	50.0	
1	1.72	Annual review of military activities	ongoing	USAF, USFWS, USMC, BEC, RT	50.0	50.0	50.0	
1	1.73	Long-term investigation of military effects on behavior	10 years	AGFD, UA, USAF, USMC	100.0	100.0	100.0	
1	1.74	Maintain updated MOU between military and USFWS	ongoing	USAF, USFWS, USMC, BEC	-	-	-	part of ongoing agency programs
1	1.75	Investigate military contaminants	3 years	USAF, USFWS, USMC	50.0	50.0	50.0	expansion of narrative action 1.7

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Priority	Task	Task Description	Task Duration	Responsible Party	Cost Estimate (in thousands)			Comments
					2002	2003	2004	
1	1.81	Human disturbance - seasonal closures	ongoing	BLM, BP, NPS, USAF, USFWS, USMC	50.0	50.0	50.0	
1	1.9	Effects of disease and parasites	5 years	AGFD, USAF, USFWS	20.0	20.0	20.0	
1	1.101	Update veterinarian contact	ongoing	USFWS, AGFD, RT	10.0	10.0	10.0	
1	1.102	Materials for medical situations and specimen salvage	ongoing	USFWS, AGFD, RT	-	-	-	cost estimates included in task 1.101
1	1.103	Notify refuge of fatalities	ongoing	USAF, USMC, NPS, BLM, AGFD, USFWS	-	-	-	part of ongoing agency programs
1	1.11	Viable population estimates	ongoing	AGFD, RT	10.0	10.0	10.0	initial population viability analysis completed; model updated periodically to reflect new data
2	2.111	Captive population demographics and genetics	5 years	Phoenix Zoo, Los Angeles Zoo, RT	50.0	200.0	200.0	
2	2.112	Captive population size	1 year	Phoenix Zoo, Los Angeles Zoo, RT	-	-	-	cost estimates included in task 2.111
2	2.113	Husbandry requirements	1 year	Phoenix Zoo, Los Angeles Zoo, RT	-	-	-	cost estimates included in task 2.111
2	2.114	Captive space availability	1 year	Phoenix Zoo, Los Angeles Zoo, RT	-	-	-	cost estimates included in task 2.111

Draft Sonoran Pronghorn Recovery Plan Implementation Schedule

Priority	Task	Task Description	Task Duration	Responsible Party	Cost Estimate (in thousands)			Comments
					2002	2003	2004	
2	2.12	Physiologic monitoring	1 year	Phoenix Zoo, Los Angeles Zoo, RT	-	-	-	cost estimates included in task 2.111
2	2.13	Hand-raising	1 year	Phoenix Zoo, Los Angeles Zoo, RT	-	-	-	cost estimates included in task 2.111
2	2.21	Evaluate reintroduction sites and techniques	3 years	AGFD, USFWS, RT	60.0	70.0	70.0	
2	2.22	Habitat criteria for reintroduction	3 years	AGFD, USFWS, RT	10.0	10.0	10.0	
2	2.23	Public input into reintroduction	1 year	AGFD, USFWS	10.0	-	-	
2	2.241	Determine predator status at reintroduction sites	3 years	AGFD, BLM, USFWS	20.0	20.0	20.0	
2	2.242	Fencing needs	1 year	AGFD, USFWS, RT	-	-	-	cost estimates included in task 2.21
2	2.243	Status and availability of preferred forage	5 years	AGFD, BLM, USFWS	-	-	-	cost estimates included in task 2.21
2	2.244	Water availability at release sites	1 year	AGFD, BLM, USFWS	-	-	-	cost estimates included in task 2.21
2	2.25	Legal aspects of reintroduction	2 years	AGFD, BLM, IMADES, USFWS	-	-	-	part of ongoing agency programs
2	2.31	Transplant herd dynamics	10 year	AGFD, USFWS, RT	100.0	100.0	100.0	

Draft Sonoran Pronghorn Recovery Plan Implementation Schedule

Priority	Task	Task Description	Task Duration	Responsible Party	Cost Estimate (in thousands)			Comments
					2002	2003	2004	
2	2.32	Review capture techniques	1 year	AGFD, USFWS, RT	-	-	-	cost estimates included in task 2.31
2	2.33	Transplant holding requirements	1 year	AGFD, USFWS, RT	-	-	-	cost estimates included in task 2.31
2	2.34	Transplant protocol	1 year	AGFD, USFWS, RT	-	-	-	cost estimates included in task 2.31
2	2.411	Monitoring - acceptable levels of loss/mgmt steps	ongoing	AGFD, USFWS, RT	-	-	-	cost estimates included in task 2.413
2	2.412	Monitoring - mgmt steps for expected/unexpected threats	ongoing	AGFD, USFWS, RT	-	-	-	cost estimates included in task 2.413
2	2.413	Monitoring - behavior and habitat use	ongoing	AGFD, BLM, USFWS, RT	50.0	50.0	50.0	
3	3.1	Aerial surveys	ongoing	AGFD, NPS, USAF, USFWS, USMC, RT	10.0	10.0	10.0	
3	3.2	Infrared aerial surveys	completed	USAF, USMC	-	-	-	results inconclusive; current technology inadequate
3	3.3	Other surveys	ongoing	AGFD, USFWS, RT	30.0	30.0	30.0	
3	3.4	Continue telemetry tracking and assessment of radiomarking goals	ongoing	AGFD, RT	50.0	50.0	50.0	
3	3.5	Recruitment	ongoing	AGFD, USFWS	10.0	10.0	10.0	

Draft Sonoran Pronghorn Recovery Plan Implementation Schedule

Priority	Task	Task Description	Task Duration	Responsible Party	Cost Estimate (in thousands)			Comments
					2002	2003	2004	
4	4.1	Evaluate taxonomic specimens	3	AGFD, BLM, NPS, USAF, USFWS, USMC	60.0	60.0	60.0	
4	4.2	Documentation of subspecies differentiation	1	AGFD, RT	-	-	-	cost estimates included in task 4.1
4	4.3	Additional information needs on taxonomic status	1	AGFD, RT	-	-	-	cost estimates included in task 4.1
Total					1,140.0	1,320.0	1,320.0	

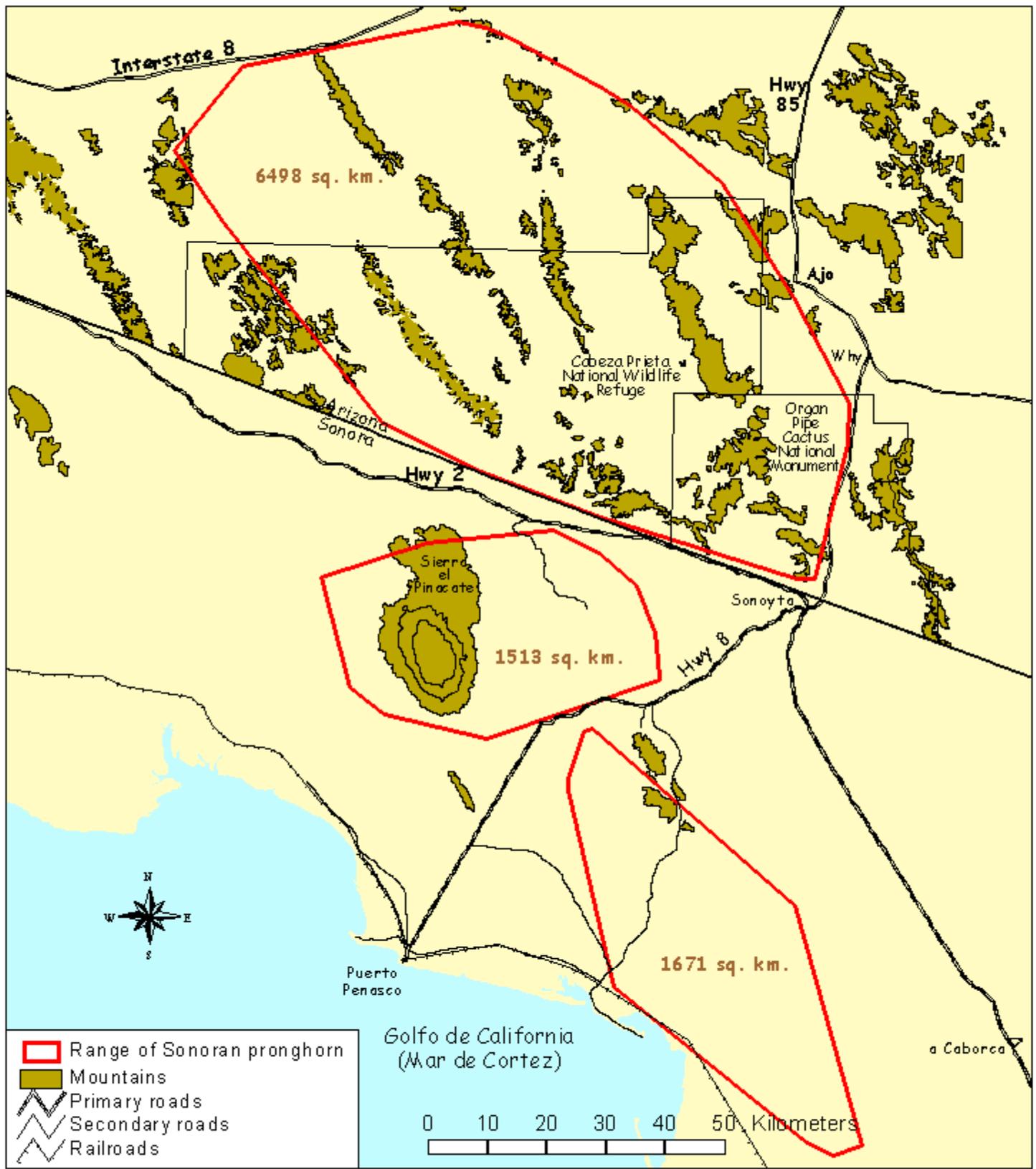


Figure 1. Current range of the Sonoran pronghorn in Arizona and Sonora, Mexico.



Figure 2. Historic Range of the Sonoran pronghorn in Arizona and Mexico.

