

Draft

# Environmental Assessment for Reestablishment of Sonoran Pronghorn

U.S. Department of the Interior  
Fish and Wildlife Service  
Region 2



1 October 2009

This page left blank intentionally

---

# TABLE OF CONTENTS

1.0 PURPOSE OF AND NEED FOR ACTION .....	1
1.1 Proposed Action .....	2
1.2 Project Need .....	6
1.3 Background Information on Sonoran Pronghorn .....	9
1.3.1 Taxonomy .....	9
1.3.2 Historic Distribution and Abundance .....	9
1.3.3 Current Distribution and Abundance .....	10
1.3.4 Life History .....	12
1.3.5 Habitat .....	13
1.3.6 Food and Water .....	18
1.3.7 Home Range, Movement, and Habitat Area Requirements .....	18
1.4 Project Purpose .....	19
1.5 Decision to be Made .....	19
1.6 Compliance with Laws, Regulations, and Plans .....	19
1.7 Permitting Requirements and Authorizations Needed .....	21
1.8 Scoping Summary .....	21
1.8.1 Internal Agency Scoping .....	21
1.8.2 Public Scoping .....	21
1.8.3 Issue Identification .....	22
2.0 ALTERNATIVES, INCLUDING NO ACTION .....	24
2.1 Alternative Formulation .....	24
2.1.1 Reestablishment Technique Options .....	24
2.1.2 Legal Status Options .....	25
2.1.3 Location Options .....	26
2.1.4 Additional Alternative Development Considerations .....	29
2.2 Alternatives Analyzed in Detail .....	30
2.2.1 Alternative I: No Action .....	31
2.2.2 Alternative II: Captive-Breeding Pen at Kofa NWR, Holding Pen at BMGR-East .....	31
2.2.3 Alternative III: Captive-Breeding Pen at BMGR-East .....	37
2.2.4 Nonessential Experimental Designation and 4(d) Rule .....	39
2.3 Mitigation Measures .....	42
2.4 Monitoring and Adaptive Management Plan .....	43
2.5 Comparison of Alternatives .....	43
3.0 EXISTING CONDITIONS AND EFFECTS .....	49
3.1 Assessment of Impacts .....	49
3.1.1 Impact Assessment Method .....	49
3.1.2 Ramifications of Nonessential Experimental Population Designation .....	51

---

3.2	Conservation Status of Sonoran Pronghorn	51
3.2.1	Existing Conditions	51
3.2.2	Effects on Conservation Status of Sonoran Pronghorn	57
3.3	Wildlife, Including Special-Status Animal Species	64
3.3.1	Existing Conditions	64
3.3.2	Effects on Wildlife, Including Special-Status Animal Species	71
3.4	Vegetation, Including Special-Status Plant Species	75
3.4.1	Existing Conditions	75
3.4.2	Effects on Vegetation, Including Special-Status Plant Species	82
3.5	Water	84
3.5.1	Existing Conditions	84
3.5.2	Effects on Water	85
3.6	Air Quality	86
3.6.1	Existing Conditions	86
3.6.2	Effects on Air Quality	88
3.7	Noise Levels	90
3.7.1	Existing Conditions	90
3.7.2	Effects on Noise Levels	91
3.8	Socioeconomic Conditions and Environmental Justice	92
3.8.1	Existing Conditions	92
3.8.2	Effects on Socioeconomic Conditions and Environmental Justice	96
3.9	Cultural Resources	98
3.9.1	Existing Conditions	98
3.9.2	Effects on Cultural Resources	99
3.10	Recreation, Wilderness, and Public Access	99
3.10.1	Existing Conditions	99
3.10.2	Effects on Recreation, Wilderness, and Public Access	105
3.11	Military Operations	106
3.11.1	Existing Conditions	106
3.11.2	Effects on Military Operations	107
3.12	Livestock Grazing	108
3.12.1	Existing Conditions	108
3.12.2	Effects on Livestock Grazing	111
3.13	Hazardous Materials	112
3.13.1	Existing Conditions	112
3.13.2	Effects on Hazardous Materials	112
3.14	Cumulative Effects	112
3.15	Irreversible and Irretrievable Commitment of Resources	119
4.0	COUNCIL ON ENVIRONMENTAL QUALITY ANALYSIS OF SIGNIFICANCE	120
5.0	EA PREPARERS	121
6.0	CONSULTATION AND COORDINATION	122

---

---

7.0 LITERATURE CITED .....	123
----------------------------	-----

## LIST OF TABLES

Table 1. Estimated U.S. population size of Sonoran pronghorn from 1924 to July 2009. ....	11
Table 2. Screening criteria scores for potential Sonoran pronghorn reestablishment areas. ....	28
Table 3. Land status of proposed Sonoran pronghorn reestablishment areas A and D. ....	31
Table 4. Summary of potential effects on resource categories from each alternative. ....	44
Table 5. Land status within the current U.S. range of Sonoran pronghorn. ....	52
Table 6. Sonoran pronghorn recruitment and release from the captive-rearing pen, 2004-2009. ....	56
Table 7. Extrapolation procedure for application of modeled habitat to all of Area D. ....	58
Table 8. Potential habitat, in square miles, for Sonoran pronghorn under the three alternatives .....	59
Table 9. Special-status animal species in the four counties encompassing the action area. ....	65
Table 10. Summary of effects on special-status animal species from alternatives II and III. ....	72
Table 11. Special-status plant species in the four counties encompassing the action area. ....	78
Table 12. Summary of effects on special-status plant species from alternatives II and III. ....	83
Table 13. Air quality attainment status .....	86
Table 14. Counties in alternative Sonoran pronghorn reintroduction areas A and D .....	93
Table 15. Population of the counties comprising areas A and D .....	94
Table 16. Economic characteristics of alternative Sonoran pronghorn reintroduction areas .....	96
Table 17. Estimated costs of alternatives II and III over the 10-year analysis period .....	97
Table 18. Federal Wilderness areas potential Sonoran pronghorn reintroduction areas A and D. ...	100
Table 19. Estimated visitor use days to King Valley, Kofa NWR, 1998-2008. ....	103
Table 20. List of reasonably foreseeable future actions planned in the action area. ....	113
Table 21. Summary of cumulative effects of the action alternatives .....	114

---

## LIST OF FIGURES

Figure 1. Historic and current ranges of Sonoran pronghorn. ....	3
Figure 2. Location of the proposed captive-breeding pen at Kofa NWR .....	4
Figure 3. Location of the proposed holding pen on the Barry M. Goldwater Range .....	5
Figure 4. Sonoran pronghorn doe (with radiocollar) and her fawn .....	7
Figure 5. Sonoran pronghorn captive-breeding pen at Cabeza Prieta NWR. ....	8
Figure 6. Sonoran pronghorn in Arizona Upland vegetation .....	14
Figure 7. Chain-fruit cholla at Cabeza Prieta NWR .....	15
Figure 8. Lower Colorado River Valley vegetation at Kofa NWR .....	17
Figure 9. Potential reestablishment areas for Sonoran pronghorn .....	27
Figure 10. Detailed location of proposed captive-breeding pen site in Area A on Kofa NWR .....	32
Figure 11. Detailed location of proposed holding pen site in Area D on BMGR-East. ....	34
Figure 12. Detailed location of alternative captive-breeding pen site in Area D on BMR-East .....	38
Figure 13. Proposed nonessential experimental population area for Sonoran pronghorn. ....	40
Figure 14. Cause and effect diagram for impact assessment .....	50
Figure 15. Potential habitat in the action area delineated using the CART model. ....	61
Figure 16. Vegetation in the action area. ....	76
Figure 17. Attainment status areas in Arizona for six criteria air pollutants .....	87
Figure 18. Race and ethnicity characteristics of the analysis areas .....	95
Figure 19. Federal Wilderness areas located within Area A. ....	101
Figure 20. Federal Wilderness areas within Area D. ....	104
Figure 21. BLM livestock grazing allotments in Area A. ....	109
Figure 22. BLM livestock grazing allotments in Area D. ....	110

# 1.0 PURPOSE OF AND NEED FOR ACTION

The U.S. Department of the Interior, Fish and Wildlife Service has prepared this Environmental Assessment (EA) to analyze potential effects to physical and biological resources and social and economic conditions that may result from reestablishment of additional populations of Sonoran pronghorn (*Antilocapra americana sonoriensis*), federally listed as an endangered species in 1967. The EA was prepared in cooperation with the U.S. Air Force - Luke Air Force Base, U.S. Army - Yuma Proving Ground, U.S. Marine Corps, Bureau of Land Management, National Park Service, and the Arizona Department of Game and Fish.

This EA will be used by the U.S. Fish and Wildlife Service (Service) to decide whether or not to undertake actions to establish additional populations of Sonoran pronghorn as proposed, if the proposed action requires refinement, or if further analyses are needed through preparation of an environmental impact statement. If the proposed action or an alternative action is selected as described or with minimal changes and no further environmental analyses are needed, a Finding of No Significant Impact will be prepared. This EA has been prepared pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) as implemented by the Council on Environmental Quality regulations (40 CFR §1500, *et seq.*)<sup>1</sup> and Department of the Interior NEPA procedures.

The EA is organized in seven chapters. Chapter 1 describes the purpose of and need for the proposed action. Chapter 2 describes the

alternatives for Sonoran pronghorn reestablishment, including the No Action alternative, and provides a summary and comparison of the effects of the alternatives. Chapter 3 presents the existing environmental conditions and discloses the effects of the alternatives for reestablishment of Sonoran pronghorn on relevant resource areas. Chapter 4 is the analysis of significance of the proposed action. Chapter 5 is the list of preparers of the EA, Chapter 6 describes consultation and coordination undertaken for preparation of the EA, and Chapter 7 is a list of information sources cited in the EA.

## QUICK REFERENCE

### CHAPTER 1 (pages 1-22)

describes the proposed action (page 2), need for the action (page 6), and purpose of the action (page 19). It also provides background information on Sonoran pronghorn (pages 9-18).

### CHAPTER 2 (pages 23-46)

describes the alternatives (pages 28-37) and provides a summary of impacts caused by the alternatives (pages 42-46).

### CHAPTER 3 (pages 47-115)

contains the detailed analysis of impacts for each of the alternatives

### CHAPTERS 4-7 (pages 116-127)

contain additional supporting information for the public and decision makers

<sup>1</sup> CFR is an acronym for the Code of Federal Regulations, which can be accessed via the Internet at <http://www.gpoaccess.gov/CFR/> (current web address as of 22 July 2009).

---

## 1.1 Proposed Action

The Service proposes to reestablish additional Sonoran pronghorn populations within its historic range in southern Arizona (Figure 1). The proposed action consists of two components: 1) construction and operation of a captive-breeding pen at Kofa National Wildlife Refuge (NWR) in Yuma County (Figure 2); and 2) relocation of some Sonoran pronghorn from the existing captive-breeding pen at Cabeza Prieta NWR to the eastern part of the Barry M. Goldwater Range - East (BMGR-East) in Maricopa County (Figure 3). All Sonoran pronghorn would be reintroduced under section 10(j) of the Endangered Species Act of 1973, as amended.

Kofa NWR is managed by the Service and BMGR-East is under the jurisdiction of the U.S. Air Force, Luke Air Force Base (AFB). Construction and operation of a second captive-breeding pen would include the following actions:

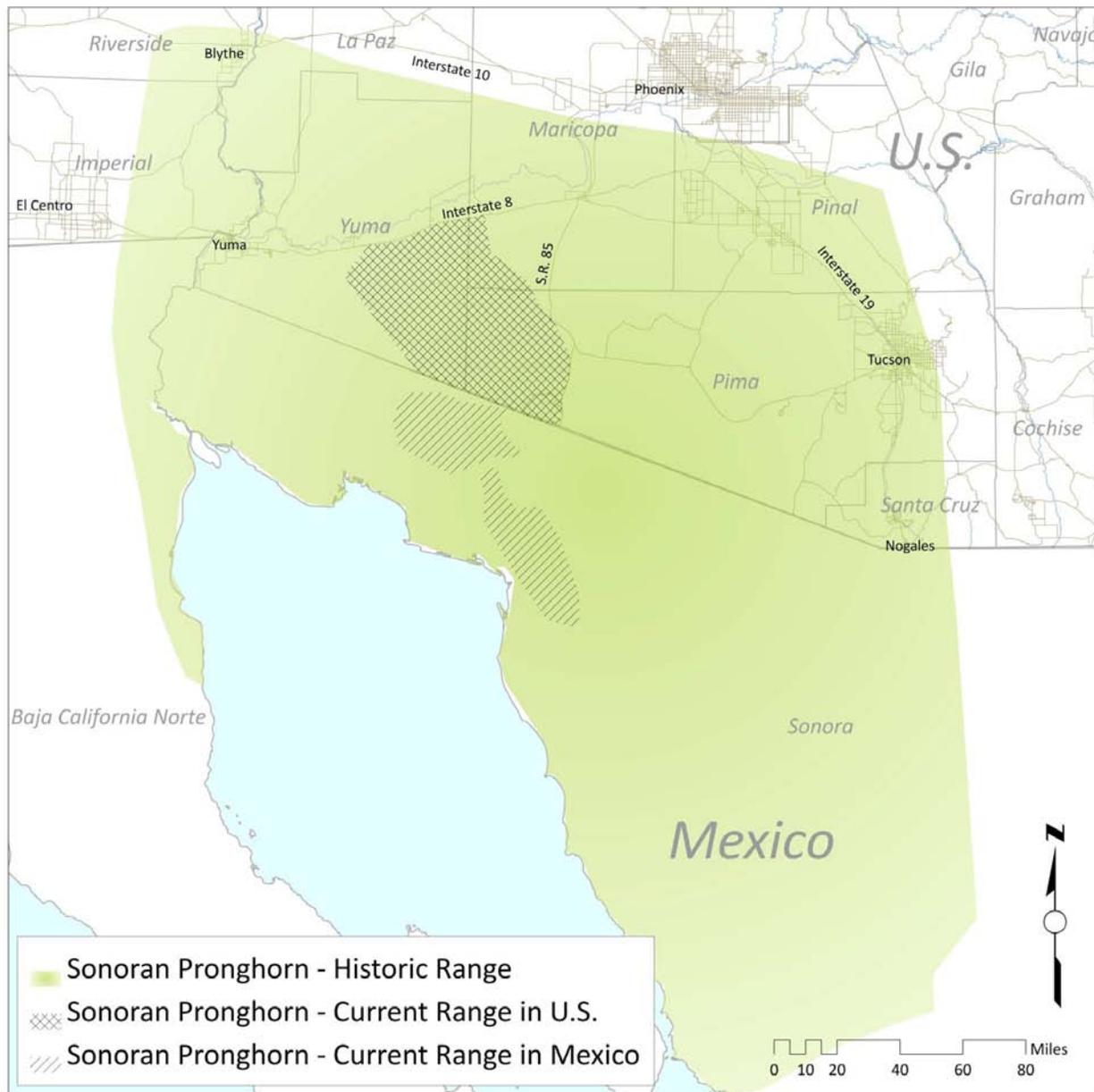
- build a captive-breeding pen for Sonoran pronghorn within the Kofa NWR beginning in the spring of 2010 (pen details described in Chapter 2);
- develop a forage enhancement plot inside the pen enclosure to irrigate native vegetation;
- develop up to five wildlife water sources outside the pen and one or two inside of the pen;
- develop a well for the forage plot to supply irrigation water and provide a water source for Sonoran pronghorn;
- move 11 Sonoran pronghorn consisting of 10 breeding-age females and one breeding-age male from the Cabeza Prieta NWR captive-breeding pen to the new pen in December 2010 and January 2011; and
- assuming successful captive-breeding at the new pen site, release up to 20 Sonoran pronghorn from the pen into suitable habitats

on Kofa NWR adjacent to the pen site each winter beginning as early as 2012-2013.

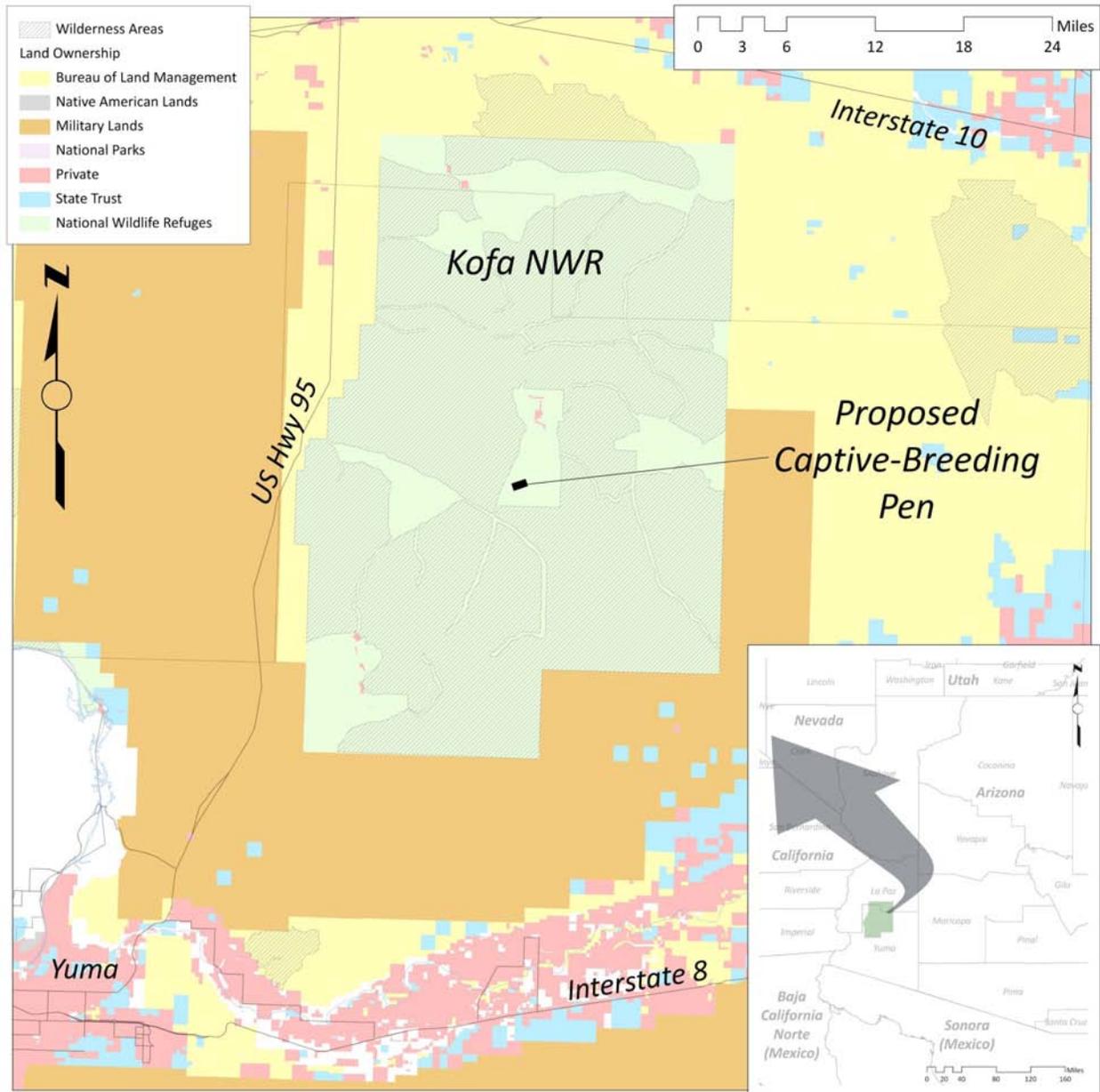
When a second captive-breeding pen is established and there are additional Sonoran pronghorn available for release, the second project component would be initiated. Capture-relocate-release activities would occur when habitat conditions in current Sonoran pronghorn range are too poor to support additional releases of animals from the Cabeza Prieta NWR captive-breeding pen or when the population of wild Sonoran pronghorn within the current U.S. range is greater than 140 animals. This action would involve the following:

- construct a holding pen within BMGR-East where animals transported from Cabeza Prieta NWR would be held for a short period to acclimate to the new surroundings; and
- in years when the Cabeza Prieta NWR captive-breeding pen reaches its carrying capacity and the habitat conditions within current Sonoran pronghorn range are not conducive to additional pronghorn releases, move up to 25 Sonoran pronghorn from the Cabeza Prieta NWR captive-breeding pen to the holding pen and release them after acclimation.

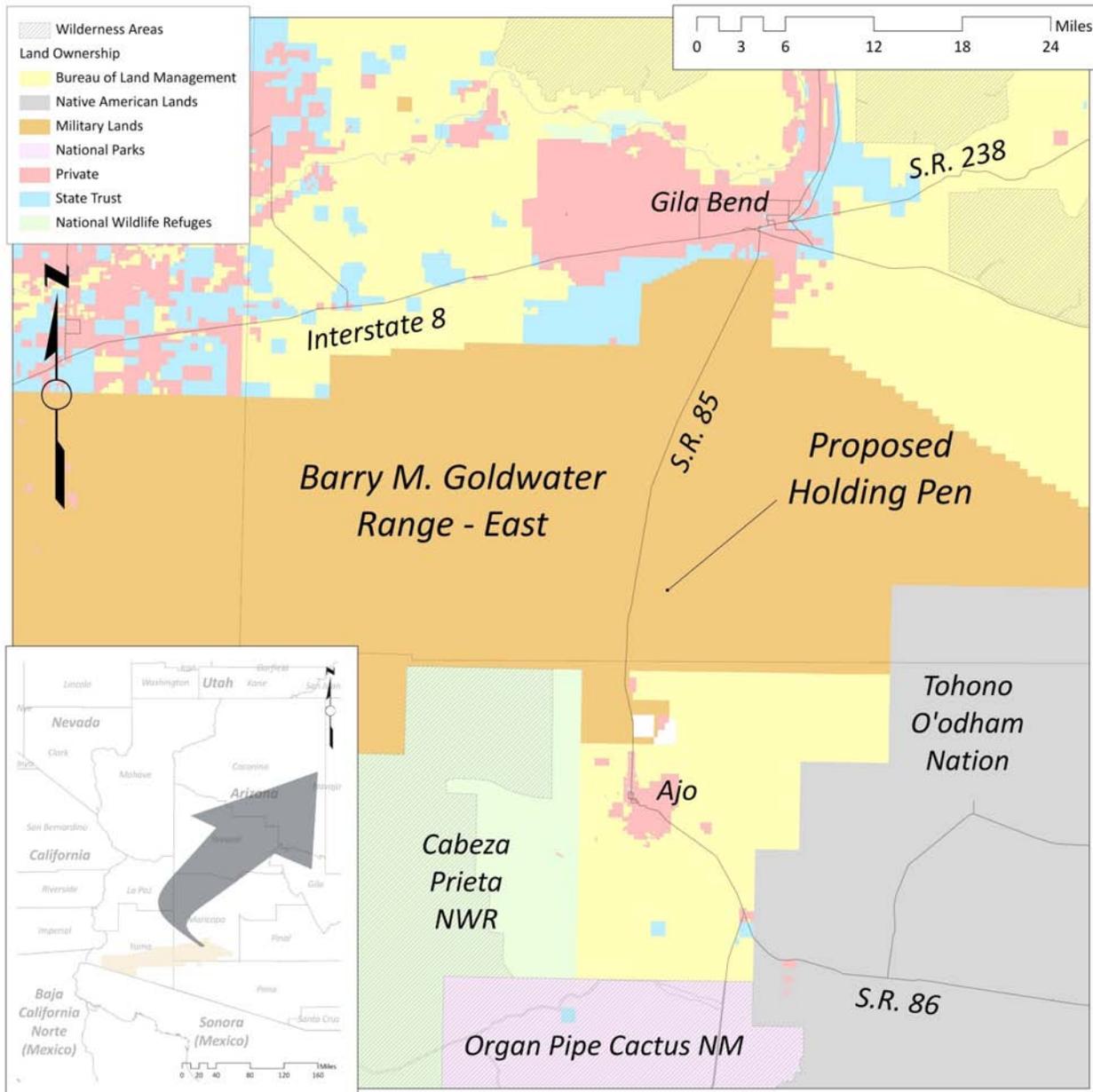
**Figure 1.** Historic and current ranges of Sonoran pronghorn. Historic range included portions of Riverside and Imperial counties in California and La Paz, Maricopa, Pinal, Pima, Santa Cruz, and Yuma counties in Arizona. Current U.S. range is limited to portions of Yuma, Maricopa, and Pima counties in Arizona. Sources of information used in mapping the approximate historic distribution shown in the figure are discussed in section 1.3.2 of this EA.



**Figure 2.** Location of the proposed captive-breeding pen at Kofa NWR.



**Figure 3.** Location of the proposed holding pen on the Barry M. Goldwater Range - East.



---

## 1.2 Project Need

The action proposed by the Service is needed because:

- establishing a second U.S. Sonoran pronghorn population is a recovery action identified in the Sonoran pronghorn recovery plan; and
- there is a need to provide for release of Sonoran pronghorn from the captive-breeding pen at Cabeza Prieta NWR to areas outside of the Refuge when range conditions within the pen and elsewhere within the Refuge are determined to be too poor to support additional pronghorn.

Sonoran pronghorn (Figure 4) was listed as endangered on 11 March 1967 (32 Federal Register 4001). Sonoran pronghorn originally inhabited and ranged widely throughout the Sonoran Desert in southern Arizona and northern Mexico, but they are now confined to an increasingly isolated and fragmented portion of their former range as a result of extensive human settlement and associated development throughout their historic range. Factors that led to the decline of Sonoran pronghorn include unrestricted hunting, livestock grazing, prolonged drought, and habitat fragmentation by fences, railroads, highways, and canals.

A recovery plan for Sonoran pronghorn was completed in 1998 (U.S. Fish and Wildlife Service, 1998) and was amended in 2002 (U.S. Fish and Wildlife Service, 2003a). Reintroduction of Sonoran pronghorn to areas within its historic range is identified in the plan as an important component in recovery (U.S. Fish and Wildlife Service, 1998: 40-42) intended to contribute to achieving the criteria for downlisting, which is a population goal of 300 animals (U.S. Fish and Wildlife Service, 2003a:36), and with the ultimate goal of delisting the species.

Sonoran pronghorn typically inhabit open terrain, relying on keen vision and speed as mechanisms to avoid predators. They have not adapted to any form of artificial barrier placed within their range and only infrequently cross roads, railroad tracks, or fences (*cf.* Brown and Ockenfels, 2007:28-32). Consequently, the cumulative pressures placed on Sonoran pronghorn severely contracted their original range in the U.S. to the current fragment bounded on the north by Interstate 8, on the east by Arizona State Route 85 (S.R. 85), and on the west by the Copper and Cabeza Prieta mountains. The entire current U.S. range is limited primarily to federally-owned land including large portions of Cabeza Prieta NWR, Barry M. Goldwater Range, which is jointly administered by the U.S. Air Force and U.S. Marine Corps, and Organ Pipe Cactus National Monument (NM), which is administered by the National Park Service. Current Sonoran pronghorn range also includes a relatively small block of land to the west and south of Ajo, Arizona, which is administered by the U.S. Bureau of Land Management (BLM).

As of February 2009, an estimated 68 Sonoran pronghorn survived in the wild in southwestern Arizona, and about another 400 occurred in northwestern Sonora, Mexico, making the subspecies among one of the most endangered land mammals in North America. Following severe drought conditions that persisted through 2002, the entire U.S. Sonoran pronghorn population declined to an estimated 21 animals. If the drought had continued, it is likely that the U.S. population would have been extirpated.

**Figure 4.** Sonoran pronghorn doe (with radiocollar) and her fawn in the captive-breeding pen at Cabeza Prieta NWR. Photo by Allen Zufelt (Arizona Department of Game and Fish, 2006).



In the fall of 2003, a captive-breeding pen was built at Cabeza Prieta NWR (Figure 5). The pen was constructed in an effort to increase the population size in the U.S. and Mexico as well as providing breeding stock for the establishment of additional populations within the U.S. (J. Atkinson, Cabeza Prieta NWR, pers. comm. 8 September 2009). The first two Sonoran pronghorn (two females from Mexico) were placed in the pen in January 2004. Over the next approximately four-and-one-half years, male and female Sonoran pronghorn both from Mexico and the U.S. were captured in the wild and added to the pen. Not all animals survived the relocation

process, and the pen population has fluctuated due to births of fawns and removals for release within Cabeza Prieta NWR, as well as mortality in the pen. As of July 2009, the pen contained 75 animals. As the population of pronghorn within the captive breeding pen at Cabeza Prieta NWR continues to increase, additional release sites beyond the vicinity of the pen and outside of the current occupied habitat within the U.S. will become necessary.

Even though the current occupied range of Sonoran pronghorn is federally managed, it is not entirely secure for conservation of the species due

to ongoing and increasing impacts associated with the smuggling of drugs and people through the Refuge and the effort to interdict smuggling. In addition, there are numerous proposed and planned projects to improve roads and add infrastructure to facilitate interdiction of illegal activities within Sonoran pronghorn habitat. The activities associated with interdiction and constructing and maintaining infrastructure threaten portions of the most sensitive and, therefore, essential remaining Sonoran pronghorn habitat.

Consequently, the Service, as the lead agency responsible for conservation of federally-listed species pursuant to the Endangered Species Act (ESA) of 1973, as amended, has been seeking opportunities to reestablish additional populations of Sonoran pronghorn under section 10(j) of the Endangered Species Act with the designation of nonessential and experimental in existing, suitable habitats within the historic range of the species (Blue Earth Ecological Consultants, Inc., 2008: 2).

**Figure 5.** Sonoran pronghorn captive-breeding pen at Cabeza Prieta NWR. Photo courtesy of the Arizona Game and Fish Department.



## 1.3 Background Information on Sonoran Pronghorn

### 1.3.1 Taxonomy

Pronghorn (*Antilocapra americana*), which occurs only in western North America, comprises four extant subspecies (Stephen *et al.*, 2005). These subspecies are the American pronghorn (*A. a. americana*), Mexican pronghorn (*A. a. mexicana*), peninsular pronghorn (*A. a. peninsularis*), and Sonoran pronghorn (*A. a. sonoriensis*; Figure 4). A fifth subspecies, *A. a. oregona*, referred to the Great Basin race of pronghorn. However, this subspecies is generally no longer recognized (Stephen *et al.*, 2005; Brown and Ockenfels, 2007: 16-18).

Sonoran pronghorn was described in 1945 from two specimens: an adult female skin and skull collected in Sonora, Mexico, and a skull of a female collected near Sonoita, Arizona (Goldman, 1945). The original analysis conferred subspecific status to the Sonoran Desert race of pronghorn based on smaller size and paler color compared to other subspecies (Goldman, 1945; Paradiso and Nowak, 1971). However, the observed morphological differences may have been due primarily to the smaller-than-average size of the type specimen (Hoffmeister, 1986: 553). Recent nuclear and mitochondrial genetic analyses indicated that Sonoran pronghorn were not particularly divergent or taxonomically distinct from other North American populations (Stephen *et al.*, 2005). Regardless of taxonomic distinction, Sonoran pronghorn represent a distinct evolutionary unit with unique adaptations to the harsh environmental conditions of the Sonoran Desert (Stephen *et al.*, 2005; Brown and Ockenfels, 2007:19).

### 1.3.2 Historic Distribution and Abundance

Published descriptions of the historic distribution of Sonoran pronghorn are based on information contained in historic reports and the few available specimens, coupled with consideration of ecological variation and geographic impediments to movement (Monson, 1968; Phelps and Webb, 1981; Hoffmeister, 1986: 553; Brown and Ockenfels, 2007: 68-69). Monson (1968: 64) concluded that there “appears to have been, on the basis of historical records, a hiatus between the ‘hot desert’ pronghorn and its cooler climate counterpart reaching from the Imperial Valley of California on the west, across the west-central part of Arizona and southeast along the divide between the Santa Cruz and San Pedro drainages in southeastern Arizona.” Phelps and Webb (1981) reconstructed a similar distribution using 12 historic records of Sonoran pronghorn occurrence. Hoffmeister (1986: 553) reported the historic distribution of Sonoran pronghorn in Arizona as “south of the Bill Williams River and west of the Baboquivari Mountains.”

From these published sources, the historic distribution of Sonoran pronghorn can be reconstructed as follows. The eastern distributional limit of Sonoran pronghorn likely extended to the area between the Baboquivari Mountains and the Santa Cruz River. The subspecies ranged northward into west-central Arizona, likely to the vicinity of present-day Interstate 10 and certainly no farther north than the Bill Williams River. The southern limit of the historic range of Sonoran pronghorn followed the mainland coastline of the Gulf of California south to near Kino Bay and east to near Hermosillo, Sonora, Mexico. Westward, the historic range of Sonoran pronghorn likely extended to the Imperial Valley of California and the northern Gulf of California coast of Baja California, Mexico (Figure 1). This reconstructed historic

distribution encompasses an area of about 55,000 square miles.

Historically, Sonoran pronghorn was relatively common throughout its range (U.S. Fish and Wildlife Service, 1998: 4). Brown and Ockenfels (2007: 69) compiled records that indicate Sonoran pronghorn were common throughout their range in the U.S. from the mid- to late-1800s. However, widespread, unregulated hunting, coupled with habitat degradation (*i.e.* conversion of desert grasslands to shrub-dominated communities; Brown and Ockenfels, 2007: 70) and competition for scarce forage, led to a dramatic decline in the distribution and abundance of pronghorn in Arizona, including the Sonoran subspecies (U.S. Fish and Wildlife Service, 1998: 22; Brown and Ockenfels, 2007: 70-73).

### 1.3.3 Current Distribution and Abundance

The current distribution of Sonoran pronghorn encompasses about 4,210 square miles, or about 7.6 percent of its historic range. The current distribution includes about 2,750 square miles in the United States and another 1,460 square miles in Mexico (Figure 1). In the U.S., Sonoran pronghorn occurs on the Cabeza Prieta NWR and adjacent areas on BMGR-East, BMGR-West, and Organ Pipe NM.

Widespread decline of pronghorn throughout Arizona began in the mid- to late-1800s with the onset of settlement, which introduced large numbers of domestic cattle and sheep to the landscape. Not only did domestic livestock compete with pronghorn for forage, but fencing to manage livestock introduced barriers to pronghorn movement throughout the landscape (Brown and Ockenfels, 2007: 70-71). Also associated with settlement was widespread shooting of pronghorn for meat, recreation, and to reduce potential competition with domestic livestock (Brown and

Ockenfels, 2007: 71-72). These impacts on pronghorn were exacerbated in the 1890s when severe, extended drought occurred throughout the region, coinciding with a peak in domestic livestock numbers (Brown and Ockenfels, 2007: 72-73).

By the 1920s, Sonoran pronghorn had declined to a population of only about 100 animals (Table 1). The population oscillated between about 50 and 100 animals up through the mid-1980s. By 1994, the U.S. population of Sonoran pronghorn had increased to 282 animals (Table 1). However, the population declined steadily from 1994 through 2002, by which time only 21 Sonoran pronghorn existed in the U.S. (Table 1). Following the severe drought of 2002, emergency recovery actions (*i.e.* forage enhancements, development of water sources, and construction of a captive-breeding pen at the Cabeza Prieta NWR) were implemented by an interagency team in an effort to bolster the declining U.S. population of Sonoran pronghorn (Otte, 2006). As of December 2008, there were at least 68 Sonoran pronghorn in the U.S. in the wild (Arizona Game and Fish Department, 2009a) and by July 2009, there were 73 Sonoran pronghorn in the captive-breeding pen (J. Atkinson, Cabeza Prieta National Wildlife Refuge, pers. comm. July 2009 - Arizona Game and Fish Department, 2009b). Consequently, the total number of Sonoran pronghorn in the U.S. in the beginning of 2009 (both in the wild and in the captive-breeding pen) was at least 131 (Table 1).

**Table 1.** Estimated U.S. population size of Sonoran pronghorn from 1924 to July 2009. Sources of data for U.S. population in the wild are: **1** Bright and Hervert (2005: 43), **2** U.S. Fish and Wildlife Service (2003a: 6); **3** Arizona Game and Fish Department (2004a); **4** J. Bright, Arizona Game and Fish Department, pers. comm., 17 July 2009; **5** Arizona Game and Fish Department (2009a). Notes: <sup>a</sup> estimate for 1941 excludes Organ Pipe Cactus NM; <sup>b</sup> estimate calculated using the sightability model method.

Time Period	Estimated Size of U.S. Population of Sonoran Pronghorn in the Wild	Number of Sonoran Pronghorn in Captive-Breeding Pen at Cabeza Prieta NWR	Data Source for U.S. Population in the Wild
1924	105	---	1
1941	60 <sup>a</sup>	---	1
1956	< 100	---	1
1968	< 50	---	1
1968-1974	50-150	---	1
1983-1985	85-100	---	1
1992	179 <sup>b</sup>	---	1,2
1994	282 <sup>b</sup>	---	1,2
1996	130 <sup>b</sup>	---	2
1998	142 <sup>b</sup>	---	1,2
2000	99 <sup>b</sup>	---	1,2
2002	21 <sup>b</sup>	---	1
2004	58 <sup>b</sup>	7	3
2006	68 <sup>b</sup>	25	4
2008	68 <sup>b</sup>	51	5
July 2009	No Data	73	---

### 1.3.4 Life History

Pronghorn reach sexual maturity as yearlings, when they are about 15 to 16 months old (Brown and Ockenfels, 2007: 37). Although females typically breed every year after reaching sexual maturity, there may be high levels of fetal reabsorption during drought years (Brown and Ockenfels, 2007: 20, 38). Mating occurs from mid-June to early July (Phelps, 1981a; Wilson *et al.*, 2008). The gestation period is about eight months. Fawns are born from late February to mid-April (deVos, 1990; Bright and Hervert, 2005; Brown and Ockenfels, 2007: 39; Wilson *et al.*, 2008). Number of young is one or two, with twins being as common as single offspring (Wilson *et al.*, 2008). Fawns likely nurse for at least three months (Bright and Hervert, 2005). Average life span of pronghorn in Arizona is about eight years for males and 10 years for females (Brown and Ockenfels, 2007: 46).

Survival of fawns is a primary determinant of Sonoran pronghorn population persistence (Hosack *et al.*, 2002). From 1995 to 2002, most Sonoran pronghorn fawn mortality occurred between three to five months of age (Bright and Hervert, 2005), when fawns were transitioning from nursing to foraging. Fawn survival is influenced by health of lactating females, nutritional content of forage for weaned fawns, availability of water, and predation (Bright and Hervert, 2005; Brown and Ockenfels, 2007: 41). Sonoran pronghorn fawn recruitment (*i.e.* survival to the end of December of the birth year) varied from 0 to 78 fawns per 100 females between 1995 and 2002 (Bright and Hervert, 2005). In comparison, McKinney and others (2008) reported mean recruitment rates ranging from 21.9 to 39.2 fawns per 100 females in populations of pronghorns in southeastern and central to northern Arizona from 1983 to 2002.

Like other populations of pronghorn in the Southwest (*e.g.* Simpson *et al.*, 2005; McKinney *et al.*, 2008), the overriding factor influencing Sonoran pronghorn fawn mortality is precipitation; namely the amount of winter rain and the amount of time between winter and summer rains (Bright and Hervert, 2005). Winter precipitation directly affects the quantity and nutritional quality of forage available to lactating females, which in turn influences their physical health and the health of nursing fawns. Low winter precipitation results in a sparse growth of forbs in the spring, which negatively impacts the condition of lactating females and their nursing fawns. Timing of the onset of summer rains affects the availability of free water and the quantity and quality of forage available to weaned fawns. Delayed onset of summer rains results in scarce forage and increases mortality rate of fawns.

Factors affecting adult survival include precipitation, predation, and disease. However, precipitation appears to play a predominate role. From 1983 through 1991, which was a period characterized by above-average rainfall, annual survival of Sonoran pronghorn was over 90 percent (deVos and Miller, 2005). However, from 1995 through 2002, which was a period characterized by variable precipitation ranging from normal to well below average, Sonoran pronghorn adult survival ranged from 17 percent to 89 percent with an average survival rate of 72 percent (Bright and Hervert, 2005). The 17 percent survival rate was during 2002, which was the driest year on record in southern Arizona. Average survival rate during dry years was 57 percent, while the average survival rate during years with normal to above-normal precipitation was 87 percent (Bright and Hervert, 2005).

Precipitation patterns also influence habitat use by Sonoran pronghorn (deVos and Miller, 2005; Hervert *et al.*, 2005), which may affect their

susceptibility to predation (Bright and Hervert, 2005). During drought periods, Sonoran pronghorn move to *bajadas*, which are broad, sloping plains formed by coalescing alluvial fans along the toeslope of mountain ranges. These habitats provide a greater abundance and diversity of forage than the valley habitats during drought and also provide a source of water in the form of chain-fruit cholla (*Opuntia fulgida*) fruits (Hervert *et al.*, 2005). However, the vegetation structure in the bajada habitats is more dense and vertically varied than the valley habitats, which may render Sonoran pronghorn more vulnerable to predation (Bright and Hervert, 2005).

Diseases potentially affecting Sonoran pronghorn (*e.g.* epizootic hemorrhagic disease, bluetongue) may be more prevalent during warm, wet periods than during dry periods (Bright and Hervert, 2005). Mortality of an adult male in the captive breeding pen at Cabeza Prieta NWR on 9 August 2007 during the monsoon season was attributed to epizootic hemorrhagic disease (Arizona Game and Fish Department, 2007a). The vector for transmission of epizootic hemorrhagic disease is a biting midge, which requires a humid substrate (*e.g.* weedy margin of a stock tank) to complete its life cycle. Adults emerge during the hot and humid monsoon season (Arizona Game and Fish Department, 2007a). Bluetongue, or catarrhal fever, is caused by the pathogenic virus *Orbivirus*. Like epizootic hemorrhagic disease, it is transmitted by biting midges (*Culicoides* spp.), which require damp, humid substrates for larval development and adult emergence. Both diseases typically cause death only in cases where the infected animal is weak or stressed.

Predators of Sonoran pronghorn include coyotes (*Canis latrans*), bobcats (*Felis rufus*), and mountain lions (*Puma concolor*; Bright and Hervert, 2005). In an eight-year long study, Bright and Hervert (2005) reported on 32 adult Sonoran pronghorn mortalities of which 12 (37

percent) were from predation. Most of these cases (six of the 11, or 54 percent) were predation by coyotes. Three of the predation mortalities were from bobcats, two were from mountain lions, and one was undetermined. Nine of the 12 predation cases (75 percent) occurred in bajada habitats (*i.e.* the paloverde [*Cercidium* spp.] - chain-fruit cholla vegetation association; Bright and Hervert, 2005). Most predation occurs during the winter months (Bright and Hervert, 2005).

### 1.3.5 Habitat

Sonoran pronghorn occur in the Sonoran Desert in wide alluvial valleys between mountain ranges and adjacent bajadas (Carr, 1981; Hervert *et al.*, 2005). These physiographic areas correspond to two vegetation subdivisions of the Sonoran Desert: the Arizona Upland and Lower Colorado River Valley (Carr, 1981; deVos and Miller, 2005). Arizona Upland vegetation (Figure 6) is found on the bajadas and is characterized by a relatively complex assemblage of species including paloverde (*Parkinsonia* spp.), mesquite (*Prosopis juliflora*), creosotebush (*Larrea tridentata*), ironwood (*Olneya tesota*), ocotillo (*Fouquieria splendens*), cholla (*Opuntia* spp.), and saguaro (*Carnegiea gigantea*; Carr, 1981; deVos and Miller, 2005; Hervert *et al.*, 2005). Chain-fruit cholla (*O. fulgida*) is a particularly important plant species in the Arizona Upland vegetation, with respect to Sonoran pronghorn (Figure 7).

**Figure 6.** Sonoran pronghorn in Arizona Upland vegetation in the captive-breeding pen at Cabeza Prieta NWR. An ephemeral wash runs across the center of the photo. Photo by Loeta Clifford (Arizona Game and Fish Department, 2007a).



**Figure 7.** Chain-fruit cholla at Cabeza Prieta NWR. The fruits are used by Sonoran pronghorn as a source of water, particularly during drought periods. Photo taken on 9 February 2009 by John Pittenger, Blue Earth Ecological Consultants, Inc.



Lower Colorado River Valley vegetation is found in the broad, flat valleys (Figure 8). The vegetation is less dense and lower-growing than vegetation of the Arizona Upland subdivision. Lower Colorado River Valley vegetation is typically dominated by creosotebush and white bursage (*Ambrosia dumosa*; Carr, 1981; deVos and Miller, 2005; Hervert *et al.*, 2005). Big galleta (*Hilaria rigida*) may also be common in areas with sandy soils (Carr, 1981). During periods of adequate precipitation, flushes of annual grasses and forbs may appear in the creosotebush-bursage flats. Many areas in the Sonoran Desert that are currently dominated by creosotebush were formerly desert grassland (*e.g.* U.S. Fish and Wildlife Service, 1998: 14; Brown and Ockenfels, 2007: 67, 70).

Desert washes occur in both the bajadas and valleys and are typically characterized by higher plant density, vigor, and diversity compared to the adjacent vegetation (Figures 7 and 9). Common species in desert washes include blue paloverde (*Cercidium floridum*), ironwood, triangle-leaf bursage (*Ambrosia deltoidea*), catclaw acacia (*Acacia greggii*), Anderson's thornbush (*Lycium andersonii*), and chuparosa (*Justica californica*; Hervert *et al.*, 2005).

Natural surface water sources within the current range of Sonoran pronghorn are scarce. Historically, Sonoran pronghorn would have had access to perennial stream segments along watercourses such as the Gila River, San Simon Wash, and the Rio Sonoyta (Carr, 1981), as well as ephemeral water sources associated with precipitation. Changes in land use and vegetation cover may also have resulted in drying and loss of desert springs in habitat of Sonoran pronghorn. Currently, surface water sources for Sonoran pronghorn consist of natural ephemeral sources, man-made rainwater catchments and tanks, and groundwater wells developed for wildlife use

(Carr, 1981; U.S. Fish and Wildlife Service, 1998: 16-17; U.S. Air Force, 2000).

Within their current range, Sonoran pronghorn typically exhibit a preference for creosotebush-bursage, paloverde-mixed cacti, and ephemeral wash habitats (deVos and Miller, 2005; Hervert *et al.*, 2005). Habitat use is influenced by season and forage condition, which is directly related to precipitation (Phelps, 1981a; Hervert *et al.*, 2005). In cool seasons when precipitation is adequate to cause a flush of annual forbs and grasses, Sonoran pronghorn exhibit a preference for creosotebush-white bursage vegetation. Paloverde-mixed cacti habitat is used particularly during dry periods, when fruits of chain-fruit cholla provide a source of water and availability of moist forage is typically higher than in the creosotebush-white bursage community. Ephemeral wash habitat is likely used for thermal cover during hot periods and also provides nutritious forage. Sonoran pronghorn prefer habitats within about six miles of desert washes and water sources and avoid areas within about three miles of roads (Hervert *et al.*, 2005).

**Figure 8.** Lower Colorado River Valley vegetation at Kofa NWR. Vegetation along the ephemeral wash in the right-center of the photo is dominated by ironwood, paloverde, Anderson's thornbush, and white ratany. View is southwest to the Castle Dome Mountains on the horizon. Photo taken on 17 November 2008 by John Pittenger, Blue Earth Ecological Consultants, Inc.



### 1.3.6 Food and Water

The primary food of pronghorn in Arizona is forbs and small shrubs (Brown and Ockenfels, 2007: 26). Sonoran pronghorn follow this same pattern, with the exception that fruits of cholla cacti, particularly chain-fruit cholla, are important in the diet (U.S. Fish and Wildlife Service, 1998: 17-18; Hervert *et al.*, 2005). Important food plants include cacti, forbs, and shrubs. Of the cacti that occur in habitats of Sonoran pronghorn, chain-fruit cholla is the most important. Its fruits are used by Sonoran pronghorn as a water source but it provides little nutritive value (Edwards and Ohmart, 1981; Hervert *et al.*, 2005).

Important forb species in the diet of Sonoran pronghorn include carelessnessweed (*Amaranthus palmeri*), suncup (*Camissonia* spp.), beeblossom (*Gaura* spp.), ragweed (*Ambrosia* spp.), milkvetch (*Astragalus* spp.), hairy prairie clover (*Dalea mollis*), spurge (*Euphorbia* spp.), California caltrop (*Kallstroemia californica*), Jones' blazingstar (*Mentzelia jonesii*), mallow (*Sphaeralcea* spp.), and desert indianwheat (*Plantago insularis*; Edwards and Ohmart, 1981; U.S. Fish and Wildlife Service, 1998: 18). Forbs appear to be a preferred diet item and are particularly important in the fall and spring (Edwards and Ohmart, 1981: 35, 41).

Shrubs commonly browsed by Sonoran pronghorn include bursage (*Ambrosia* spp., particularly white bursage), paloverde, white ratany (*Krameria grayi*), brittlebush (*Encelia farinosa*), buckwheat (*Eriogonum* spp.), burrobrush (*Hymenoclea monogyra*), mesquite, and ironwood (Edwards and Ohmart, 1981; U.S. Fish and Wildlife Service, 1998: 18).

The importance of free water to Sonoran pronghorn has been debated in the past (Phelps, 1981a; U.S. Fish and Wildlife Service, 1998: 14-15) but current research indicates it is vital,

particularly during drought periods when preformed water (*i.e.* water bound in plant tissue) is scarce (Hervert *et al.*, 2005: 13).

### 1.3.7 Home Range, Movement, and Habitat Area Requirements

About 200 square miles (128,000 acres) of suitable habitat is thought to be needed to support a viable, long-term population of 100 female pronghorn in suboptimal pronghorn habitats such as those found within the range of Sonoran pronghorn (Brown and Ockenfels, 2007: 26). Home range of Sonoran pronghorn varies with season and habitat quality (Phelps, 1981a; deVos and Miller, 2005; Hervert *et al.*, 2005). Mean home-range was 197.3 square miles in a sample of 35 radiocollared Sonoran pronghorn studied over an eight-year period (Hervert *et al.*, 2005). Although home-range size did not vary significantly between wet and dry years, it did vary significantly with habitat use. Sonoran pronghorn that preferred paloverde-mixed cacti habitat had significantly smaller home-range size (mean = 105.3 square miles) than those that preferred or used creosotebush-bursage habitat equal to its availability (mean = 510 square miles; Hervert *et al.*, 2005). This difference was likely due to the area Sonoran pronghorn had to move to find sufficient forage and water in the two habitats.

## 1.4 Project Purpose

The purpose of the proposed action is to contribute to recovery of Sonoran pronghorn by establishing additional populations in suitable habitat within its historic range in Arizona (Figure 1). Establishing a second population of Sonoran pronghorn is a recovery action (USFWS, 1998: 40) that is intended to contribute to achieving the criteria for downlisting, which is a population goal of 300 animals (USFWS, 2003a: 36), and with the ultimate goal of delisting the species.

## 1.5 Decision to be Made

The U.S. Fish and Wildlife Service Southwest Regional Director will decide whether or not to select a site for construction and operation of a second captive-breeding pen for Sonoran pronghorn and, if so, which site to select. The Regional Director will also decide whether or not to release Sonoran pronghorn through a capture-relocate-release method. Cooperating agencies whose lands may be affected by the selected alternative would be co-signers of the finding of no significant impact prior to implementation of any actions. Cooperating agencies for this EA include the U.S. Air Force - Luke Air Force Base, U.S. Army - Yuma Proving Ground, U.S. Marine Corps, Bureau of Land Management, National Park Service, and the Arizona Department of Game and Fish.

## 1.6 Compliance with Laws, Regulations, and Plans

This EA has been prepared in compliance with all applicable Federal statutes, regulations and executive orders (EO) including, but not limited to, the following:

- National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C.] 4321 et seq.)
- Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508);
- U.S. Fish and Wildlife Service Manual, Part 550, Chapter 1 (National Environmental Policy Act - Policy and Responsibilities) and Chapter 2 (National Environmental Policy Act Compliance Guidance).
- Clean Air Act of 1972 (42 U.S.C. 7401-7671, as amended);
- Clean Water Act (CWA) of 1977 (33 U.S.C. 1251 et seq.);
- Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544, as amended);
- Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq., as amended);
- Migratory Bird Treaty Act of 1918;
- Farmland Protection Policy Act, 1981 (7 U.S.C. 4201, as amended);
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470);
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001-3013);
- American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996);
- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470);
- Protection of Historic and Cultural Properties (36 CFR 800 et seq.);
- Federal Noxious Weed Act (7 U.S.C. 2801);
- E.O. 11514, Protection and Enhancement of Environment Quality;
- E.O. 11593, Protection and Enhancement of the Cultural Environment;
- E.O. 11988, Floodplain Management;
- E.O. 11990, Protection of Wetlands;
- E.O. 12898, Environmental Justice;
- E.O. 13007, Indian Sacred Sites;

- E.O. 13084, Consultation and Coordination with Indian Tribal Governments;
- E.O. 13112, Invasive Species Management; and
- E.O. 13186, Protection of Migratory Birds.

In addition, all action alternatives will comply with the Final Revised Sonoran Pronghorn Recovery Plan (U.S. Fish and Wildlife Service, 1998) and the Supplement and Amendment to the 1998 Final Revised Sonoran Pronghorn Recovery Plan (U.S. Fish and Wildlife Service, 2003a).

The proposed action and alternatives are consistent with the March 2007 Barry M. Goldwater Range Integrated Natural Resources Management Plan (U.S. Air Force *et al.*, 2008; 1-1). The actions would not reduce military capabilities of BMGR-East and would benefit a federal listed species. Therefore, they are consistent with section 1.1 of the resource management plan (D. Garcia, Environmental Science Management Chief, Luke AFB, pers. comm., 17 February 2009).

Kofa NWR and Wilderness is managed under direction provided by an interagency management plan (Bureau of Land Management *et al.*, 1996). The proposed action and action alternatives would be consistent with this plan which, although the plan did not anticipate Sonoran pronghorn reintroduction, provides for “allowable resource uses within an ecologically compatible and sustainable framework while minimizing impacts to wilderness values” (Bureau of Land Management *et al.*, 1996:53).

The BLM Yuma District is in the process of finalizing a new Resource Management Plan (Bureau of Land Management, 2008). The proposed plan provides for reestablishment of Sonoran pronghorn through provisions WF-015 and TE-044. WF-015 "supports reintroductions, transplants, and supplemental stockings

(augmentations) of wildlife populations...in current or historic ranges in collaboration with AZGF (Arizona Game and Fish Department) ... and/or the USFWS (U.S. Fish and Wildlife Service) and other agencies where such reintroductions are within areas deemed suitable through BLM policy and procedure to (1) maintain populations, distributions and genetic diversity; (2) conserve or recover threatened or endangered species; (3) restore or enhance native wildlife diversity and distribution; and (4) maintain isolated populations. Species that could be reintroduced, transplanted or augmented include but are not limited to Sonoran pronghorn..." TE-044 states: " Unfragmented habitat is provided in the planning area that is capable of contributing to the potential reintroduction of Sonoran pronghorn as a step toward recovery of the species within the historic range." Should Sonoran pronghorn released on non-BLM lands subsequently move onto BLM lands within the Lower Sonoran Field Office, the animals would receive the appropriate level of protection, as established by the Service and BLM regulations and policies.

---

## 1.7 Permitting Requirements and Authorizations Needed

The following permits and authorizations would be required for implementation of the proposed action or other action alternatives:

- dust control permit - Maricopa County Air Quality Department;
- water rights for well drilling;
- well drilling permit - Arizona Department of Water Resources;
- Endangered Species Act Section 7 consultation - U.S. Fish and Wildlife Service, Arizona Ecological Services;
- migratory bird permit (if needed) - U.S. Fish and Wildlife Service, Region 2, Migratory Bird Permit Office;
- cultural resources consultation - Arizona State Historic Preservation Officer and interested tribal entities;
- BMGR-East public use/access permit; and
- permit from the Arizona Department of Agriculture to move any protected plant species.

## 1.8 Scoping Summary

### 1.8.1 Internal Agency Scoping

Federal, state, and tribal government agency representatives were invited by the Service to an interagency scoping meeting held in Gila Bend, Arizona. One meeting objective was to develop a list of issues associated with implementation of each preliminary alternative. Members of the Sonoran Pronghorn Recovery Team as well as representatives from other land-management agencies located in southwestern Arizona composed an interdisciplinary team which met on

17 and 18 June 2008. Sixteen agency representatives attended one or both days of the meeting. Agencies represented included the U.S. Fish and Wildlife Service - Cabeza Prieta NWR, U.S. Fish and Wildlife Service - Kofa NWR, U.S. Fish and Wildlife Service - Arizona Ecological Services Office, BLM - Yuma Field Office, BLM - Lower Sonoran Field Office, National Park Service - Organ Pipe Cactus NM, U.S. Air Force - Luke AFB, U.S. Army - Yuma Proving Ground, U.S. Navy - Marine Corps Air Station Yuma, Tohono O'odham Nation, and Arizona Game and Fish Department.

### 1.8.2 Public Scoping

Public scoping for the Sonoran pronghorn reestablishment project was conducted in the fall of 2008. Public involvement activities included a scoping letter sent to approximately 6,000 persons and organizations and a series of three open houses held in the Arizona cities of Yuma, Tucson, and Phoenix. Potentially-interested and/or affected persons, groups, and organizations were identified through review of mailing lists provided by Organ Pipe Cactus NM and Luke AFB. These were compiled into a project mailing list consisting of 949 names.

A scoping letter was sent by U.S. Mail to all names on the project mailing list on 30 October 2008. The letter included a detailed project description, information about the upcoming public open houses, and information on how to comment on the proposed project, including a self-addressed comment form to be returned to the Service. Additionally, the scoping letter was mailed to 36 BLM grazing permittees and 15 BLM Resource Advisory Council members. Electronic copies of the same scoping letter were sent by the BLM to approximately 5,000 persons from the Lower Sonoran Field Office Resource Management Plan mailing list.

Three open houses were held on consecutive nights in Yuma, Tucson, and Phoenix from 18 November through 20 November to introduce the proposed project to the public, answer questions, and identify public issues. Each open house consisted of the same series of posters describing the project need and proposed action, maps of the alternative project area sites, a project time line, and information on how to comment. Staff from the Service and its cooperators were on hand to discuss the history of Sonoran pronghorn conservation and recovery proposed actions, listen to public concerns, answer questions, and take written comments from the public.

Written public scoping comments were accepted until 12 December 2008 regarding the initially-proposed actions. Forty-four written responses (letters, e-mails, and comment forms) were received about the project (Blue Earth Ecological Consultants, Inc. 2009a). Nine were solely requests to remain on the project mailing list, and the Arizona Department of Transportation provided information on their related projects with no comments on the project. The 35 remaining letters or comment forms each had one or more comments; 27 of these were generally supportive of efforts to reestablish Sonoran pronghorn. Remaining comments were used by the interdisciplinary team to identify significant issues from which the proposed action and alternatives were refined and mitigation measures to avoid or reduce potential project effects were identified. The public concerns were also used by the team to determine which resources would be the greatest focus of the EA analysis (Chapter 3).

### 1.8.3 Issue Identification

An issue, in the context of NEPA, is a cause-and-effect relationship that may result from implementation of an action. An issue is a point of disagreement, debate, or dispute with a proposed action, based on some anticipated effect. Significant issues (*i.e.* issues within the scope of the proposed action, not already decided by law, regulations, or land management plan, and relevant to the decision to be made) related to the proposed project have been addressed in this EA either through the formulation of the alternatives and mitigation measures in Chapter 2 or in the analysis of effects on the particular resource of concern (e.g. recreation) in Chapter 3. Significant issues identified during the Sonoran pronghorn reestablishment project scoping processes (internal and public) are that the proposed project may:

- restrict current land uses (*i.e.* grazing, farming, mining, military actions);
- restrict recreation access or activities (*e.g.* hunting, hiking, ORV use, camping) ;
- cause the establishment and/or spread of invasive plant species;
- change the protective status of wild Sonoran pronghorn should they cross into the designated 10(j) area;
- result in unwise use of tax dollars which could be better spent elsewhere;
- result in job development or other economic benefits to local communities;
- be detrimental to the Wilderness experience as a result of placement of permanent water structures and more human incursions into Wilderness areas (*e.g.* overflights for surveys, construction and maintenance of water structures);
- disturb cultural resource sites for construction of facilities;

- change visual quality of an area as a result of facility placement and design, including affects on traditional cultural uses;
- restrict traditional cultural practices;
- be a significant Federal action which would require preparation of an environmental impact statement;
- undermine the Wilderness Act if construction of water developments occurs in Wilderness;
- result in a policy of predator control or may not address the need for predator control;
- restrict hunting, ORV, or other recreational activities and public access;
- be proposed for one or more areas not in historic Sonoran pronghorn range and/or suitable habitat for Sonoran pronghorn; and
- utilize water source that is not of sufficient quality for irrigation of food plots or as a drinking source for Sonoran pronghorn.

---

## 2.0 ALTERNATIVES, INCLUDING NO ACTION

This chapter describes the process that was used to develop alternatives for establishing additional populations of Sonoran pronghorn within its historic range. This chapter also includes a summary table that compares the effects or consequences of the alternatives on pertinent resources. The detailed analysis of effects of the alternatives are described in Chapter 3.

### 2.1 Alternative Formulation

Development of alternatives for establishing additional U.S. populations of Sonoran pronghorn entailed consideration of three key variables: 1) geographic areas for reestablishing populations; 2) potential reestablishment techniques; and 3) legal status of reestablished populations under the Endangered Species Act (ESA). Each of these three key variables had a range of options. The project interdisciplinary team evaluated the three key variables to arrive at the most effective combinations of geographic areas, reestablishment techniques, and legal status options. These combinations were refined into alternatives for establishing additional populations of Sonoran pronghorn in the U.S. The following sections summarize the interdisciplinary team evaluations of the key variable options.

#### 2.1.1 Reestablishment Technique Options

Three methods of establishing new populations of Sonoran pronghorn were considered in formulating alternatives: 1) free-release; 2) capture-relocate-release; and 3) captive-breeding pen. Free-release of Sonoran pronghorn entails capturing animals from the wild or a captive-

breeding pen, loading them into a trailer, driving them to a new location, and releasing them into the wild. Capture-relocate-release involves similar steps in capturing and transporting animals to a new location. With this method, however, the animals are released into a holding pen, allowed to acclimate to the area for a few days, and then released. The captive-breeding pen method moves captured animals to pen where they are held for a year or more with the expectation that they will reproduce within the pen, similar to what has occurred at Cabeza Prieta NWR. Eventually, adult Sonoran pronghorn (captured wild or captive-reared) are released from the pen into adjacent suitable habitats.

The risk of injury or mortality posed to Sonoran pronghorn from these three methods ranges from relatively high with free-release to relatively low with a captive-breeding pen. Risk to animals is associated with capture and handling, which are greatest with the free-release method. The captive-breeding pen method minimizes exposure of animals to handling stress.

The interdisciplinary team concluded that the best technique to establish a second Sonoran pronghorn population in the U.S. would be to construct and operate a second captive-breeding pen similar to the one now in operation at Cabeza Prieta NWR. Though more costly than other techniques, this method poses the fewest risks to animals and people and highest potential for successful establishment of a second population. Capture-relocate-release of a large group (*e.g.* 25 animals) was discussed as an additional technique that could be used when the Cabeza Prieta NWR captive-breeding pen reaches its carrying capacity and the habitat conditions within current Sonoran pronghorn range are not conducive to additional pronghorn releases.

---

## 2.1.2 Legal Status Options

Options for legal status of reestablished populations pertain to section 10(j) of the ESA. This section of the ESA allows for designation of reintroduced populations of a listed species established outside the species' current range but within its historical range as "experimental." Section 10(j) of the ESA requires that an experimental population be geographically isolated from other wild populations of the same species. As described in section 2.1.3, the alternative reintroduction areas are geographically separated from the wild population in the current U.S. range by barriers to movement of Sonoran pronghorn. Thus, any reintroduced populations would not overlap with any wild populations. Sonoran pronghorn do not occur in any of the alternative reintroduction areas. All Sonoran pronghorn released for reestablishing additional populations should remain within reintroduction areas because of barriers to their movement outside of these areas. Similarly, movement of wild Sonoran pronghorn from the current U.S. range into potential reintroduction areas is unlikely. Sonoran pronghorn released for reestablishing additional populations would be marked. In the unlikely event that animals move outside of a reintroduction area, they would be captured and returned to the reintroduction area.

An experimental population must also be designated as either "essential" or "nonessential" to the continued existence of the species. Sonoran pronghorn reintroduced into areas within their historic range would not be essential to the continued existence of the species for three reasons. First, the current wild U.S. population of about 68 animals and the 73 animals in the captive-breeding pen at Cabeza Prieta NWR are the primary species populations. The captive-breeding pen at Cabeza Prieta NWR would continue to function to add animals to the existing wild population within the current U.S. range,

thereby furthering its security. Secondly, reintroduced populations of Sonoran pronghorn would be genetically redundant with the primary species populations. Reintroductions would not reduce or degrade the existing repository of genetic diversity contained in the primary species populations. Thirdly, any Sonoran pronghorn lost through reintroduction efforts would be replaced by the captive-breeding program at the Cabeza Prieta NWR pen.

The ESA "take" prohibitions are reduced under a "nonessential and experimental population" designation. The interdisciplinary team concluded that a "nonessential and experimental population" designation would provide the necessary management flexibility for protecting and recovering Sonoran pronghorn while ensuring that the activities of federal agencies and private landowners are unaffected. Several of the agency representatives on the interdisciplinary team indicated that nonessential and experimental status would be a prerequisite for accepting reestablishment of Sonoran pronghorn on their lands.

For the reasons described above, all of the action alternatives were formulated with designation of reintroduced Sonoran pronghorn as nonessential and experimental populations.

## 2.1.3 Location Options

**2.1.3.1 Identification of Potential Reestablishment Areas** Federal or state ownership was the first criterion for selection of potential areas for locating captive-breeding or holding pen facilities for Sonoran pronghorn. This criterion was considered to be of primary importance because it would potentially allow for greater control of land management activities or uses. The interdisciplinary team conducted a mapping exercise, based on expert knowledge of team members, to identify areas within the historic range of Sonoran pronghorn in the U.S. that were under federal or state ownership and that contained suitable habitat for the species. The result of this exercise was identification of seven potential areas (Figure 9).

Boundaries of these potential reintroduction areas were delineated, in part, by major man-made barriers, such as interstate highways and paved two-lane roads with right-of-way fencing. Paved roads with right-of-way fences are “virtually pronghorn proof due to stringent fencing and high volume traffic” and interstate highways are “nothing short of impassable” (Brown and Ockenfels, 2007:29). Roads lacking right-of-way fences were not considered to be barriers because Sonoran pronghorn, especially those raised in a captive-breeding pen, may move across them. Pronghorn “readily cross dirt roads and less traveled highways as long as the fences are passable” (Brown and Ockenfels, 2007: 29).

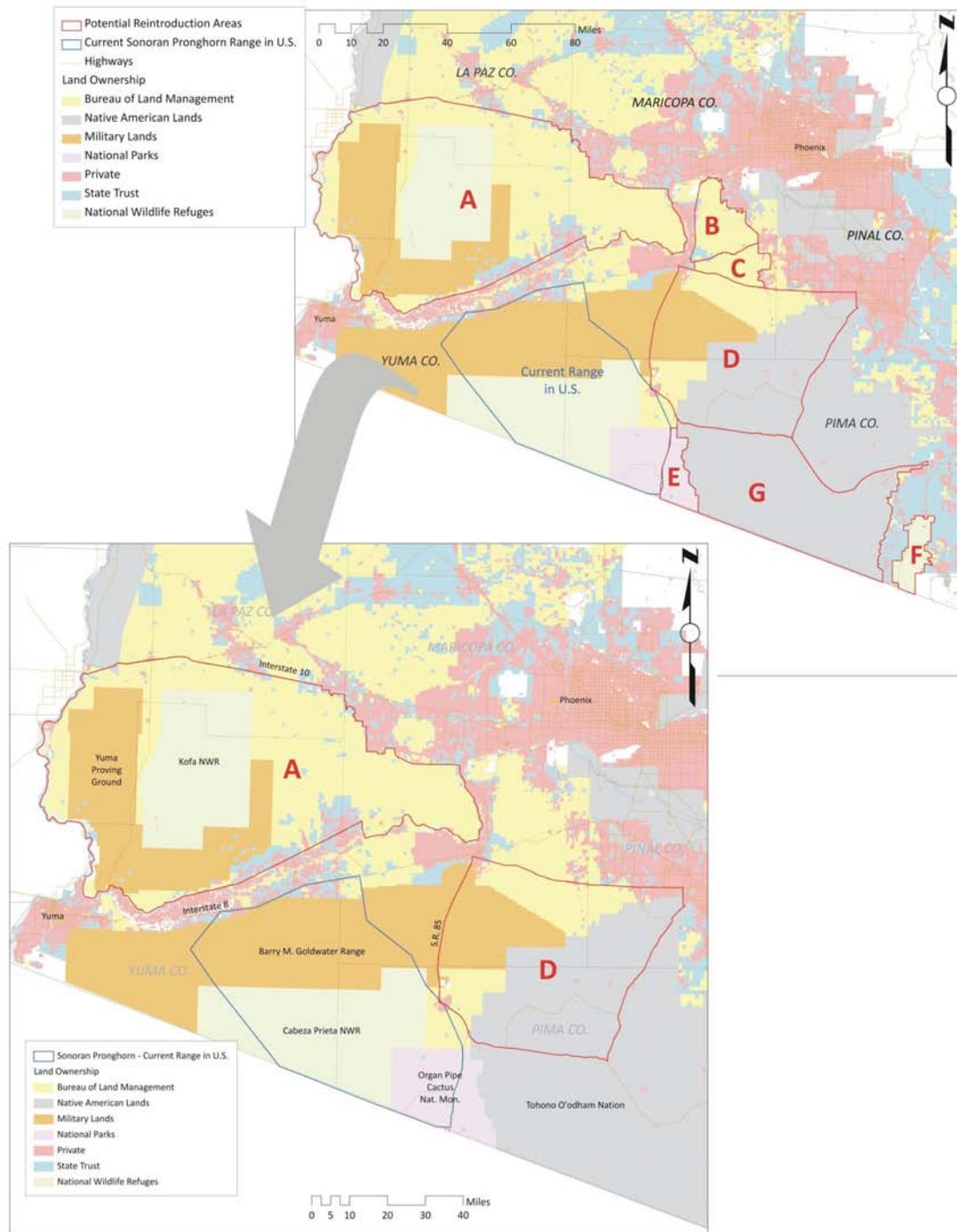
State Road 85 forms the western boundary of Area D. This road has a right-of-way fence and traverses shrubby habitat which is abruptly interrupted by the open roadway. These aspects of the S.R. 85 corridor combine to form a fairly strong barrier to movement of Sonoran pronghorn. In contrast, the U.S. 95 corridor through Area A is not fenced and traverses habitat characterized by sparse, low-growing vegetation that does not

contrast sharply with the roadway and shoulders. Therefore, the U.S. 95 corridor through Area A was not considered to serve as a substantial impediment to movement of Sonoran pronghorn. Natural barriers (*e.g.* mountain ranges, rivers) form other portions of the boundaries of potential reestablishment areas.

**2.1.3.2 Development of Location Screening Criteria** The interdisciplinary team developed and applied screening criteria to evaluate and compare the seven potential areas for establishing additional populations of Sonoran pronghorn. The screening criteria were:

1. size of area (acreage);
2. forage (quality of forage throughout the area, based forage conditions current at the time and past rainfall patterns);
3. water (rainfall patterns, condition and number of existing waters, and suitability for new waters);
4. degree of habitat fragmentation (by roads, railroads, fences, canals);
5. degree of disturbance (human disturbance is the primary consideration, may result from recreation, military activities, Border Patrol activities, border crossing by undocumented aliens);
6. logistics (including considerations of access to area for building and maintaining a captive-breeding or holding pen, waters, and forage enhancements, communications, and safety);
7. other factors (such as presence of predators, competitor abundance, and prevalence of disease).

**Figure 9.** Potential reestablishment areas for Sonoran pronghorn as identified by the interdisciplinary team during the internal scoping meeting held in June 2008, shown in the upper panel. The two areas forwarded for detailed analysis (A and D) are shown in the lower panel.



With respect to the size criterion, it was determined by the interdisciplinary team that an area must have the capacity to support at least 50 Sonoran pronghorn. This lower limit threshold was defined based on consideration of a population viability analysis for Sonoran pronghorn (Hosack *et al.*, 2002) and other published research on minimum population size (Reed *et al.*, 1986; Samson *et al.* 1990; Scott, 1990). The area needed to support a minimum viable population was recognized as being dependent on habitat quality and precipitation patterns. For example, average annual home range of Sonoran pronghorn at Cabeza Prieta NWR varies with habitat quality and may range from about 17 mi<sup>2</sup> when habitat quality is high to about 1,109 mi<sup>2</sup> in low habitat quality conditions (Hervert *et al.*, 2005). The remaining six criteria were applied qualitatively, as consistent quantitative data were generally lacking.

**2.1.3.3 Application of Location Screening Criteria** The seven potential areas for establishing additional populations of Sonoran pronghorn in the U.S. were ranked for each of the screening criteria by the interdisciplinary team, which deliberated as an expert panel. Ranking was conducted on a relative basis. The area with the best or highest qualitative value for a specific criterion was assigned a score of seven. The area with the poorest or lowest qualitative value for a specific criterion was assigned a score of one. The remaining five areas were then scored according to their rank relative to the highest and lowest scored areas. The results of applying the screening criteria are shown in Table 2.

**Table 2.** Screening criteria scores for potential Sonoran pronghorn reestablishment areas. Refer to Figure 9 for a map showing locations of the areas.

Screening Criteria	Area						
	A	B	C	D	E	F	G
Size	7	4	1	6	2	3	5
Forage	6	3	2	7	4	1	5
Water	7	5	3	6	4	1	2
Fragmentation	6	2	1	5	7	4	3
Disturbance	7	4	5	6	3	2	1
Logistics	7	5	4	6	3	2	1
Other	5	4	6	3	7	2	1
Total Score	45	27	22	39	30	15	18
Percentage of Total Possible Points	92%	55%	45%	79%	61%	31%	37%
<b>Rank</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>7</b>	<b>6</b>

The percentage of total possible points was calculated for each area by dividing the total score for the area by 49 (*i.e.* a score of seven for each of the seven screening criterion). The resulting percentages were used to rank the areas (Table 2). The interdisciplinary team concluded that the percentages could be used as an indicator of the probability for successful establishment of an additional population of Sonoran pronghorn. After considerable discussion, the team decided that areas with scores of 70 percent or lower had too much uncertainty of success to warrant investment of substantial amounts of funding, effort, and Sonoran pronghorn. This left two areas: A and D (Figure 9).

### 2.1.4 Additional Alternative Development Considerations

During a February 2009 interdisciplinary team meeting, potential alternatives were refined with additional factors needed for making a decision for relocating Sonoran pronghorn from Cabeza Prieta NWR to a new site, whether into a breeding pen or a holding pen. These additional factors are described below.

- Sonoran pronghorn must be captured for relocation from the Cabeza Prieta breeding pen by one of two methods: 1) as a group of animals in a corral trap (*e.g.* boma); or 2) individually darted. Breeder bucks are captured in the wild either by darting or net gun from a helicopter.
- Using the individual darting method would take longer to capture numerous animals than would rounding up the pronghorn in a corral trap.
- Using either capture method, it would take one to two months to capture and transport 20 to 25 pronghorn for transport to and release from a holding pen.
- Capture of 11 animals for establishment of a breeding pen may take up to two months.
- Use of a corral trap for capture allows easier identification of a pronghorn, allowing the desired animals to be retained and other animals to be released. Darting sometimes results in capture of a pronghorn that is not desired for removal from the breeding pen.
- Once captured, Sonoran pronghorn need to be transported to their new location as quickly as possible to prevent injuries and capture-related stress.
- The longer a pronghorn is immobilized and restrained during the capture and transport process, the more handling it requires and, therefore, is more susceptible to stress.
- Transporting the pronghorn after capture may either be accomplished by air (helicopter) or on the ground (truck-and-trailer).
- Transportation by truck-and-trailer allows for up to several dozen animals to be moved simultaneously.
- Transportation by helicopter allows for a maximum of two animals to be moved per trip.
- Transportation by air is much faster for moving each *individual* pronghorn from Cabeza Prieta NWR breeding pen to either a new breeding pen or holding pen. Transportation by air is a much slower process for moving a *group* of pronghorn from Cabeza Prieta NWR to Area A or Area D due to the time it would take to dart and transport no more than two pronghorn at a time.

- It takes about four times as long to move pronghorn from the Cabeza Prieta NWR breeding pen to Area A as it would to move them to Area D. For example, trucking pronghorn to Area A would take about four hours while trucking the animals to Area D from Cabeza Prieta NWR would take about one hour. Transporting pronghorn by helicopter to Area A would take one hour; flying animals to Area D would take about 10 to 15 minutes.
- Transportation by truck-and-trailer is more stressful to pronghorn due to nearly 11 miles of rough road that must be traveled to get from the breeding pen to a paved road and then subsequent travel.
- Helicopter transport is substantially more expensive than truck-and-trailer transport as the helicopter must be paid for while waiting on the ground as well as for flying time (\$875/hour).
- The amount of anesthetic needed to transport an animal is directly related to the trip duration.

## 2.2 Alternatives Analyzed in Detail

Two potential locations for Sonoran pronghorn reestablishment, Area A and Area D, were carried forward by the interdisciplinary team for detailed analysis in this EA. Area A consists of approximately 4,791 square miles (mi<sup>2</sup>) in portions of Yuma, La Paz, and Maricopa counties (Table 3; Figure 9). Area D is composed of approximately 2,379 mi<sup>2</sup> within Maricopa, Pima, and Pinal counties (Table 3; Figure 9). Both areas contain federal, state, tribal, and private lands.

Lands managed by the Service in Area A include Kofa NWR (1,039.1 mi<sup>2</sup>), Imperial NWR (29.0 mi<sup>2</sup>), and Cibola NWR (17.6 mi<sup>2</sup>). Military lands are under the jurisdiction of Yuma Proving Ground, while the BLM lands are managed by two offices - the Yuma Field Office in the Yuma District and the Lower Sonoran Field Office in the Phoenix District. State lands include 3.5 mi<sup>2</sup> of Arizona Game and Fish Department lands (Painted Rock Wildlife Area) and 215.6 mi<sup>2</sup> of State Trust Lands. More than one-half (52.9 percent or 1,258.3 mi<sup>2</sup>) of Area D is within the Tohono O'odham Nation, and most of the remaining area is split between BMGR-East (21.1 percent) and BLM lands managed by the Lower Sonoran Field Office (22.8 percent; Figure 9), which includes the portion of the Sonoran Desert NM south of Interstate 8.

Two methods of reestablishing Sonoran pronghorn populations at these locations were also carried forward for detailed study: a captive-breeding pen and a holding pen using the capture-relocate-release scenario. Only one ESA status option - "experimental and nonessential population" - was considered as viable for reestablishing Sonoran pronghorn populations in areas A or D. Using these criteria, two action alternatives were formulated for reestablishing one or more Sonoran pronghorn populations within its historic range in southern Arizona. The No Action Alternative is also considered in this EA as a means against which to measure changes that would result from either action alternative.

**Table 3.** Land status of proposed Sonoran pronghorn reestablishment areas A and D. Percentages do not sum exactly to 100 due to rounding.

LAND OWNER/MANAGER	AREA A		AREA D	
	Square Miles	Percent of Area	Square Miles	Percent of Area
Bureau of Land Management	2,054.1	42.9%	541.5	22.8%
Department of Defense	1,297.8	27.1%	502.0	21.1%
U.S. Fish and Wildlife Service	1,085.7	22.7%	0	0.0%
Bureau of Reclamation	24.8	0.5%	0.2	<0.1%
Tribal Lands	4.6	0.1%	1,258.3	52.9%
State of Arizona	219.1	4.6%	12.4	0.5%
County	0	0.0%	4.0	0.2%
Private	104.5	2.2%	60.9	2.6%
<b>TOTAL</b>	<b>4,790.5</b>		<b>2,379.3</b>	

### 2.2.1 Alternative I: No Action

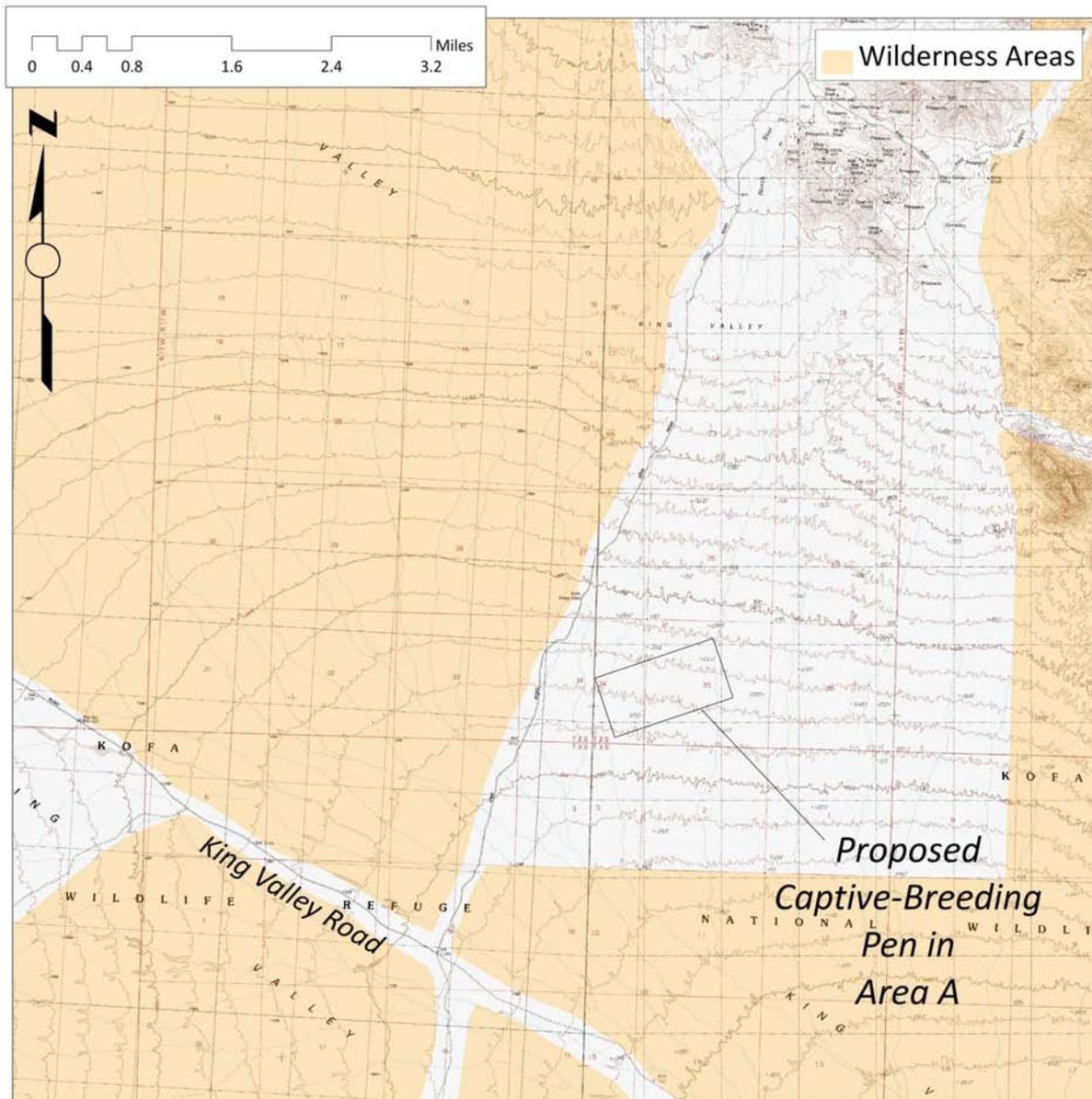
The no action alternative would not undertake any actions to reestablish Sonoran pronghorn populations in the U.S. Operation of the captive-breeding pen at Cabeza Prieta NWR, implementing seasonal closures, and releasing animals into the current U.S. range would continue. Also, BMGR-East would continue Sonoran pronghorn monitoring and associated protection measures for Sonoran pronghorn. Organ Pipe Cactus NM would continue its monitoring and seasonal closures to protect Sonoran pronghorn. This alternative would not meet the project purpose and need. It would not contribute to meeting the downlisting criteria of establishing a second U.S. population of Sonoran pronghorn. This alternative provides a baseline for comparison of environmental effects of the proposed action and action alternatives discussed in Chapter 3.

### 2.2.2 Alternative II: Captive-Breeding Pen at Kofa NWR, Holding Pen at BMGR-East

Alternative II would involve release of Sonoran pronghorn into both areas A and D (Figure 9). Sonoran pronghorn would be released with a nonessential experimental population designation under section 10(j) of the ESA (see section 2.2.4 for more discussion of the 10[j] designation).

For the captive-breeding pen portion of this alternative, a pen would be constructed at the selected site in Area A within Kofa NWR (Figures 2 and 10).

**Figure 10.** Detailed location of proposed captive-breeding pen site in Area A on Kofa NWR. The center of the pen is in the SW 1/4 of Section 35, Township 2 South, Range 17 West at Universal Transverse Mercator (UTM) coordinates 221174 meters East, 3678396 meters North (UTM Zone 12 North, North American Datum of 1983). Latitude-longitude coordinates of the center of the pen are 33° 12.59' North latitude and 113° 59.48' West longitude (North American Datum of 1983).



After construction, 11 pronghorn (10 females and one male) would initially be moved from Cabeza Prieta NWR to the Kofa NWR pen. These animals would be individually darted and moved one or two at a time by helicopter. Biennial rotation of the breeding male and death of any pronghorn in the breeding pen would require additional flights to bring new animals from Cabeza Prieta NWR.

After establishment of a captive-breeding pen operation in Area A, and when conditions at Cabeza Prieta NWR have reached their capacity to support more Sonoran pronghorn, about 20 to 25 animals would be captured from the Cabeza Prieta NWR breeding pen, transported to a holding pen on BMGR-East in Area D (Figures 3 and 11), held temporarily, and then released as a group. Ideally, the pronghorn would be captured together and moved quickly to a holding pen, allowed to recover for a brief period, and released altogether. This activity would occur annually as long as habitat conditions at Cabeza have reached their capacity to support additional pronghorn. The interdisciplinary team was uncertain as to how this larger quantity of pronghorn would be captured and transported for this component of the project. Lessons learned as progress continues in removing pronghorn from the Cabeza Prieta NWR captive-breeding pen and relocating them to other parts of the Refuge in the near future will be used to develop the capture-relocate-release strategies.

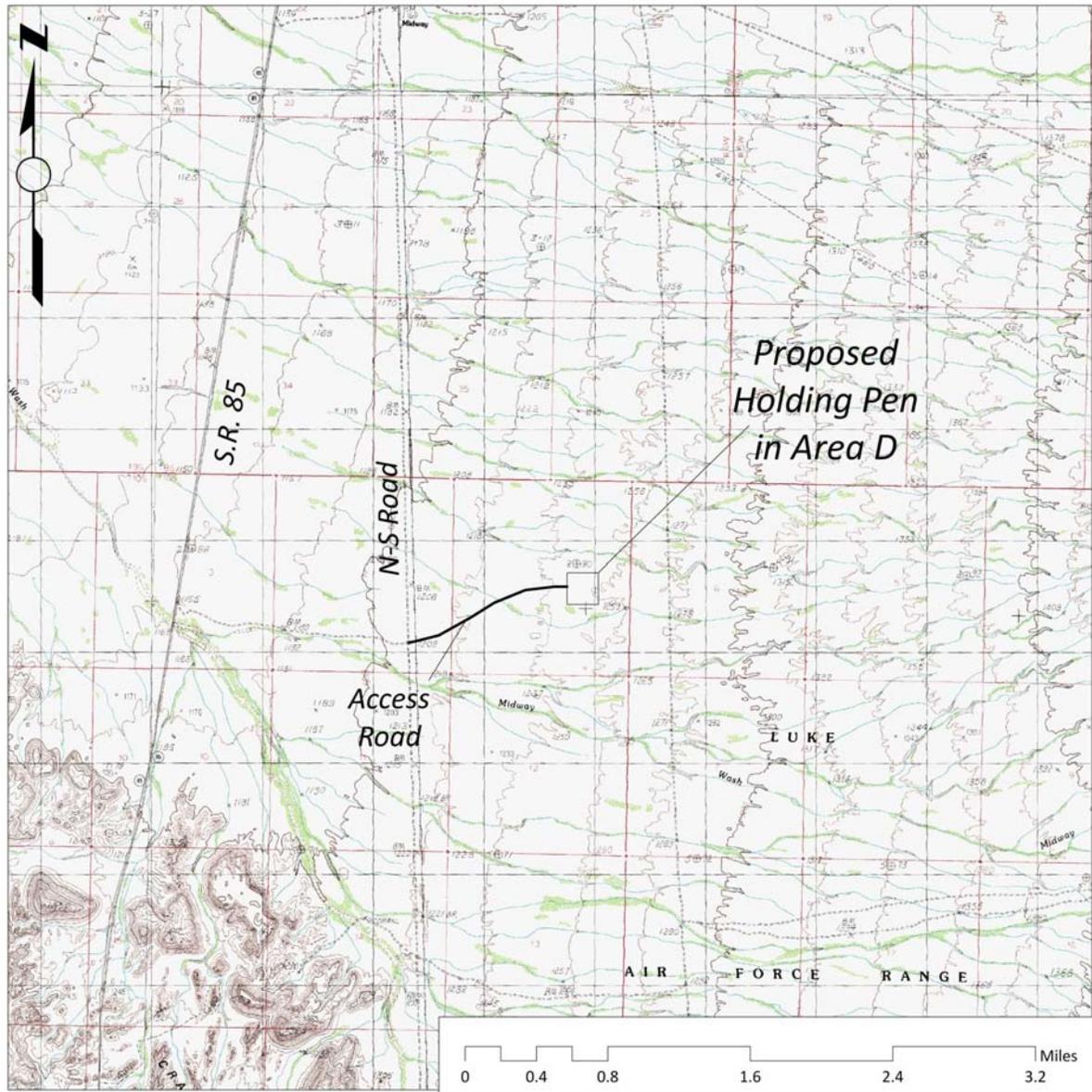
**2.2.2.1 Captive-Breeding Pen at Kofa NWR** Construction of a second captive-breeding pen in Area A at Kofa NWR in Yuma County would begin in the late spring of 2010 and continue for three months, including the following direct and connected actions:

- Build a rectangular-shaped, 0.5 mi<sup>2</sup> in area (ca. 6,070 ft x 2,300 ft) captive-breeding pen beginning in spring 2010. The pen would be constructed with woven wire game fence 5.5-

ft high with one foot of the fence buried underground to deter predators. The interior of the fence would be lined with material that would create a visual blind for predators and reduce potential for pronghorn leg injuries in the fence. Construction of the pen would take three months (including associated irrigation system).

- Construct internal division fences to partition the enclosure into two or more pens for management purposes. Each smaller pen would have two sections of fence capable of being removed to allow access between pens and for release of Sonoran pronghorn from the pens. Each pen would have a walk-through gate to allow pedestrian access for management purposes.
- Construct a 12 ft by 12 ft recovery pen inside the breeding pen for short-term observation of each individual pronghorn after transport to the site.
- Develop 10 to 12 forage enhancement plots inside the pen enclosure to irrigate native vegetation. Plots would be linear and total acreage less than five percent of pen area.
- Develop up to seven water sources, including up to two inside of the pen and five outside of the pen, but none in the Kofa Wilderness. Construction of the water sources would take approximately two to three weeks

**Figure 11.** Detailed location of proposed holding pen site in Area D on BMGR-East. The center of the pen is in the SE 1/4 of Section 1, Township 10 South, Range 6 West at UTM coordinates 327922 meters East, 3606610 meters North (UTM Zone 12 North, North American Datum of 1983). Latitude-longitude coordinates of the center of the pen are 32° 35.12' North latitude and 112° 49.99' West longitude (North American Datum of 1983).



- 
- Develop a water system to supply irrigation water to the forage plots and provide a water source for Sonoran pronghorn. This would entail drilling a well and installation of a storage tank and gravity-fed water supply lines. Water lines would be either buried about six to 12 inches deep in already-disturbed road bed or laid on top the ground. Yellow Mine pipe would be used, which allows for surface installation without pipe degradation.
  - Existing two-track road would be used for access to the pen site; no road blading would be needed. Some minor maintenance of access may be needed under certain environmental conditions (*e.g.* after hard rainfall).
  - Construct at least two observation towers, approximately 25 ft high, on concrete pads located around the perimeter of the pen. The purpose of these is for daily observation of pronghorn and for monitoring the enclosure. Each tower would be covered with military surplus camouflage netting to reduce the visual impact of the structures.
  - Construct dirt road about 12 ft wide around the perimeter of the pen to provide access for management and security purposes, including serving as a fire break for protection of the pen and pronghorn.
  - Construct a facility inside the breeding pen to capture and remove pronghorn from breeding pen (*e.g.* corral trap or boma).
  - Construct two electric fences around the outside of the pen to deter predators. The primary electric fence, located just a few inches outside of the pen fence, would consist of four smooth wires connected with insulators to the main enclosure fence t-posts. These wires would be 6", 12", 20", and 28" above the ground. The secondary electric fence would be located six feet from the primary electric fence and would consist of two wires at 10" and 30" above the ground. The electric fences would be solar powered and would have signs in both English and Spanish that explain the dangers of the fences. Operation of a second captive-breeding pen in Area A at Kofa NWR would include the following direct and connected actions:
    - From December 2010 through January 2011, capture by individually darting 11 Sonoran pronghorn, consisting of 10 breeding-age females and one breeding-age male, from the Cabeza Prieta NWR captive-breeding pen. Immediately transport captured pronghorn by helicopter to the new breeding pen in Area A at Kofa NWR. This would entail from six to 11 helicopter flights from Cabeza Prieta NWR to Kofa NWR over one to two months. At least one round-trip helicopter flight would be needed every two years from Cabeza Prieta NWR to Kofa NWR to rotate breeding males (*i.e.* bring in a new male and take out the current breeding male). Additional flights may be needed if there is mortality among the original 11 animals. A fuel truck would be located at the Cabeza Prieta NWR landing site during helicopter operations.
    - Hire two new full-time pronghorn pen monitors; monitors would likely be stationed in Yuma, Arizona. At least once a day, a monitor would check on the security of the pen for the presence of predators and proper operation of the electric fence. The monitors would feed the pronghorn with alfalfa hay daily, irrigate forage plots in pen, and ensure water is being provided in the pen. Each round trip from Yuma to the pen site would be about 150 miles.
-

- Assuming successful captive-breeding at the new pen site, release up to 20 Sonoran pronghorn (each release) from the captive-breeding pen into suitable habitats on Kofa NWR lands adjacent to the pen site, beginning as early as the winter of 2012-2013 and recurring each winter until 2020.
- Sonoran pronghorn released into the wild may occupy potential habitat throughout Area A, which includes portions of La Paz, Yuma, and Maricopa counties. The released pronghorn population would be monitored bi-monthly using a fixed-wing aircraft flying at an altitude of approximately 1,000 ft.
- The sustainability of the released population would be evaluated every five years. After 10 years, the need for the pen would be reevaluated.

#### 2.2.2.2 Holding Pen at BMGR-East

When the second captive-breeding pen has been established in Area A and there are additional Sonoran pronghorn available for release from the Cabeza Prieta NWR captive-breeding pen, moving and releasing these pronghorn into Area D would be considered for establishment of a third population. These relocation actions would occur when habitat conditions at Cabeza Prieta NWR are too poor to support additional wild pronghorn (*i.e.* those not in the captive-breeding pen) or when the population of Sonoran pronghorn within the current U.S. range is greater than 140 animals. After initial release of Sonoran pronghorn in Area D, additional releases would be made to promote the establishment of the population.

Actions toward establishing a third Sonoran pronghorn population would involve construction of a 20-acre holding pen in Area D within BMGR-East (Figures 3 and 11) where pronghorn transported from Cabeza Prieta NWR would be held to acclimate to the new surroundings. The

proposed pen site is in the Hat Mountain area (locally known as BMGR-East “Area B”) in Maricopa County, which is open to permitted public use. A 0.5-mile buffer around the pen would restrict public use in that immediate area. The pen would be constructed in a manner similar to the captive-breeding pen (*e.g.* same type of wire, height of fences) but with a much smaller configuration.

There may be a 12 ft by 12 ft recovery pen within the holding pen, but there would be no observation towers. Temporary scaffolding may be used for periodic monitoring. Temporary water and supplemental food would be provided; there would be no irrigated forage plots. Road work for access to the site would entail grading approximately 500 feet of new road leading from the North-South road to the east, including crossing the railroad tracks. Also, a dirt road would be constructed around the holding pen.

In years when sufficient Sonoran pronghorn are available to move from the captive-breeding pen at Cabeza Prieta NWR, it is anticipated that the holding pen would be used continuously for six to 10 weeks once per year during winter months. Up to 25 Sonoran pronghorn would be moved from the Cabeza Prieta NWR captive-breeding pen to the holding pen, adding animals to the holding pen as they are captured from Cabeza Prieta NWR pen. Pronghorn may be moved by helicopter or truck and trailer. Once all pronghorn to be relocated from the Cabeza Prieta NWR captive-breeding pen have been moved into the holding pen, all animals would be released into the wild together. Therefore, the first pronghorn captured and moved would remain in the holding pen for up to 10 weeks while the last one to be captured would be there for about one day.

Sonoran pronghorn released into the wild may occupy potential habitat throughout Area D, which includes portions of Maricopa, Pima, and

---

Pinal counties. The population established with released Sonoran pronghorn would be monitored bi-monthly using a fixed-wing aircraft flying at an altitude of approximately 1,000 ft. If wildlife water development are needed outside of the pen for the new population, a cultural resource survey of potential water sites would be undertaken before construction of these waters.

### 2.2.3 Alternative III: Captive-Breeding Pen at BMGR-East

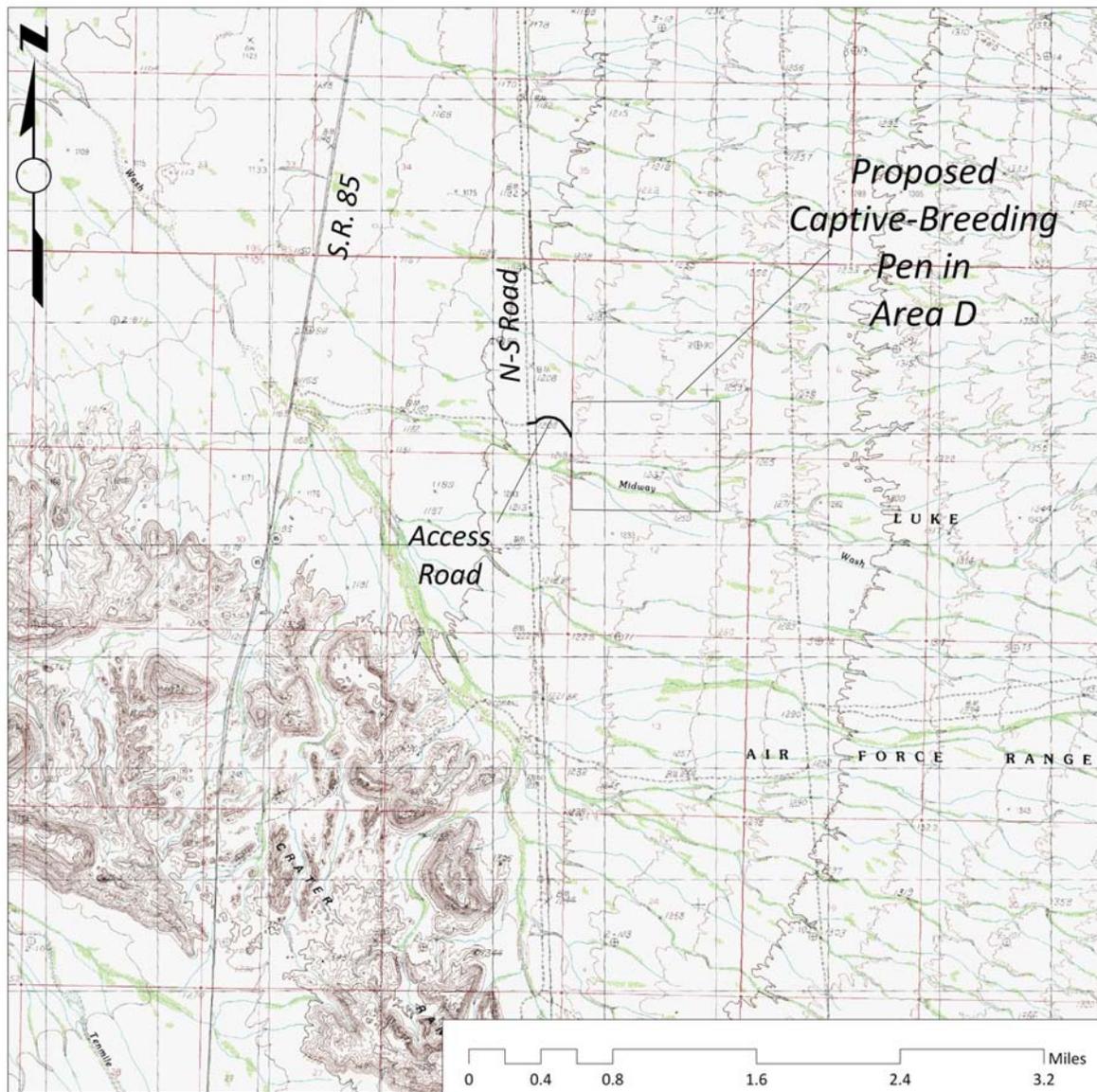
Alternative III would involve reestablishment of Sonoran pronghorn only in Area D (Figure 9). Sonoran pronghorn would be released into Area D with a nonessential experimental population designation under section 10(j) of the ESA (see section 2.2.4 for more discussion of the 10[j] designation).

This alternative would construct and operate a captive-breeding pen at BMGR-East to establish a second population of Sonoran pronghorn in Area D (Figure 12). The captive-breeding pen would be constructed at the same location as the holding pen at BMGR-East that is described in Alternative II. Construction and operation of the captive-breeding pen at BMGR-East would essentially be the same as with Alternative II (*i.e.* same size, configuration, and features), with a few exceptions. Construction and operation features that would be unique to the captive-breeding pen at BMGR-East are:

- access to the breeding pen site would require blading a new road approximately 1,500 ft long, beginning at the BMGR-East 'North-South Road' and continuing east, including crossing the abandoned railroad tracks;
- pronghorn monitors would be located in Ajo and travel approximately 30 miles round-trip for pronghorn feeding and monitoring each trip.

Unlike Alternative II, Alternative III would not have a provision for establishing a third population of Sonoran pronghorn. Instead, when conditions at Cabeza Prieta NWR warrant relocation of Sonoran pronghorn from that captive-breeding pen to somewhere other than Cabeza Prieta NWR (as previously-described), pronghorn would be moved to BMGR-East and released into the wild with the intent that they would join with the second population that would be establishing at BMGR-East through operation of the captive-breeding pen. A separate holding pen would not be constructed for this alternative. Rather, a portion of the captive-breeding pen would be fenced off to hold animals translocated from the Cabeza Prieta NWR pen until all relocated animals could be reassembled at BMGR-East and then released into the wild.

**Figure 12.** Detailed location of alternative captive-breeding pen site in Area D on BMR-East. The center of the pen is in the SW 1/4 of Section 35, Township 2 South, Range 17 West at UTM coordinates 221174 meters East and 3,678,396 meters North (Zone 12 North, North American Datum of 1983). Latitude-longitude coordinates of the center of the pen are 33° 12.59' North latitude and 113° 59.48' West longitude (North American Datum of 1983).



---

## 2.2.4 Nonessential Experimental Designation and 4(d) Rule

Under either of the action alternatives (*i.e.* Alternative II or Alternative III), Sonoran pronghorn would be released under section 10(j) of the ESA and classified as a nonessential experimental population, as described above in section 2.1.2. Section 10(j) of the ESA allows for establishing populations of listed species outside of their current range, but within their historic range, as experimental. Nonessential classification is appropriate in this case because Sonoran pronghorn that are captive-bred and released, as described in the action alternatives, would not be essential to the continued existence of the species in the wild (*cf.* Section 2.1.2).

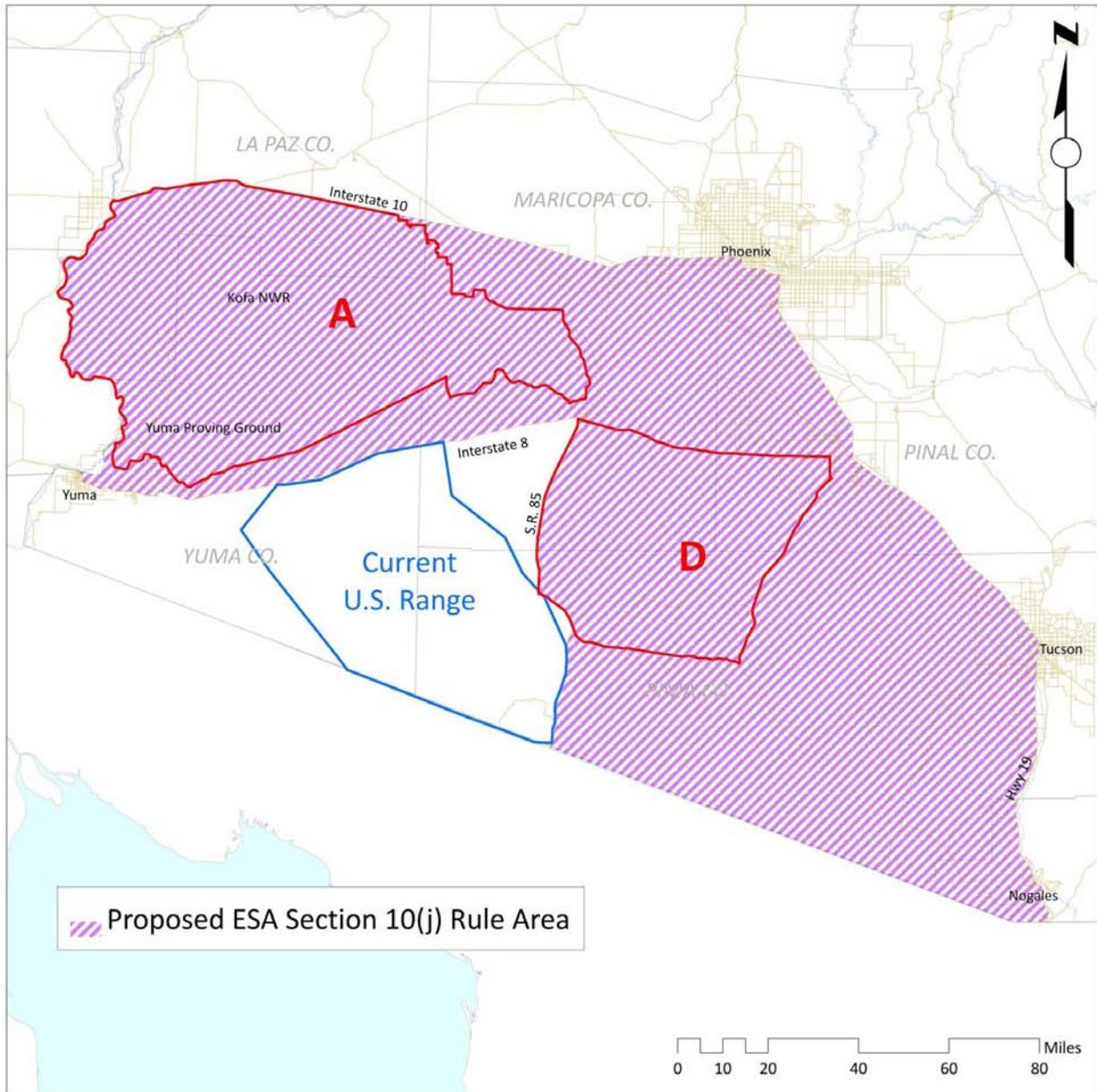
The nonessential experimental classification would be applied to a larger geographic zone encompassing the action area (Figure 13). The proposed nonessential experimental population area is located entirely in Arizona and is bounded on the south by Interstate 8 and the U.S. Mexico border, on the north and east by Interstates 10 and 19, and on the west by the Colorado River and S.R. 85 (Figure 13). This area represents the maximum geographic extent that Sonoran pronghorn would be likely to move in if they are released into areas A or D. It is most likely that Sonoran pronghorn released into areas A or D would remain within the boundaries of those areas due to the extent of suitable habitat within the areas and the location of barriers to movement around the perimeters of the areas. However, in the unlikely event that released Sonoran pronghorn began to expand outside of the nonessential experimental population area, the Service would propose amending the 10(j) rule to enlarge the boundaries of the area. Under the proposed nonessential experimental population designation, the ESA status of Sonoran pronghorn

would be defined geographically. Any Sonoran pronghorn within the nonessential experimental population area (Figure 13) would be considered part of the nonessential experimental population. Conversely, any Sonoran pronghorn outside of the nonessential experimental population area would be fully protected under the ESA as an endangered species.

Designation of a population as experimental within the defined geographic area means that it is treated as threatened, which allows for greater management flexibility with respect to the prohibitions of take proscribed under section 9 of the ESA. Furthermore, section 4(d) of the ESA allows the Service to adopt appropriate regulations for conservation of threatened species, which may include relaxing or limiting section 9 prohibitions of take.

For the purposes of ESA section 7 consultation, the nonessential experimental population of Sonoran pronghorn would still be treated as a threatened species on National Wildlife Refuge or National Park Service lands within the designated area. Outside of National Wildlife Refuge and National Park Service lands, the nonessential experimental population of Sonoran pronghorn would be treated as proposed for listing for the purposes of ESA section 7 consultation. In this case, federal agencies are required to confer (not consult) with the Service on actions that are likely to jeopardize the continued existence of the species and also, in the case of the BLM, on actions that may affect and are likely to adversely affect the species. The results of a conference consist of discretionary conservation recommendations.

**Figure 13.** Proposed nonessential experimental population area for Sonoran pronghorn.



---

Because the nonessential experimental population is, by definition, not essential to the continued existence of the species, conferencing would likely never be required. Actions that have no federal nexus (*i.e.* that are not funded, authorized, permitted, or implemented by a federal agency) are not subject to the provisions of section 7 of the ESA.

Within the nonessential experimental population area (Figure 13), take of Sonoran pronghorn would be prohibited except under the following circumstances.

- 1) Pronghorn may be taken within the nonessential experimental population area when it is incidental to, and not the purpose of, carrying out an otherwise lawful activity within the boundaries of Yuma Proving Ground, BMGR-East, lands of the Arizona State Land Office, BLM lands, privately-owned lands, and lands of the Tohono O'odham Nation, Colorado River Indian Reservation, Ak-Chin Indian Reservation, Pascua Yaqui Indian Reservation, and San Xavier Indian Reservation within the nonessential experimental population area (Figure 13).
- 2) Pronghorn may be taken within the nonessential experimental population area with a valid permit issued by the Service under section 17.32 of the ESA for educational or scientific purposes or for the enhancement of propagation or survival of the species, and other conservation purposes consistent with the ESA.
- 3) Pronghorn may be taken within the nonessential experimental population area by an employee or agent of the Service, Arizona Game and Fish Department, or

any of the tribes listed in #1 above who is operating within the boundaries of their respective tribal lands, who is designated for such purposes and is acting in the course of official duties, under the following circumstances:

- a) when it is necessary to aid a sick, injured, or orphaned Sonoran pronghorn, including rescuing such animals from canals;
- b) when it is necessary to dispose of a dead Sonoran pronghorn specimen, or to salvage a dead specimen that may be useful for scientific study;
- c) when it is necessary to move a Sonoran pronghorn within the nonessential experimental area for genetic management purposes or to improve the health of the population; or
- d) when it is necessary to capture and release Sonoran pronghorn to collect biological data or to attach, service, or detach radio-telemetry equipment.

Under any of the above conditions where take is allowed, if take should occur it would be necessary to report it to the Service as soon as possible. It would be unlawful for any individual to take a Sonoran pronghorn within the nonessential experimental population area in violation of any of the above three conditions.

## 2.3 Mitigation Measures

Mitigation measures are prescribed to avoid, reduce, or compensate for adverse effects of an action on natural, cultural, and socioeconomic resources. If either action alternative (Alternative II or Alternative C) is selected, the following mitigation measures would be implemented:

**Water Quality** Construction equipment would be inspected daily and monitored during operation to prevent leaking of fuels or lubricants. If leaks are detected, equipment would be immediately repaired or removed from the site. In the interim, leaking fluids would be captured and contained.

**Noise Levels** To reduce temporary construction noise, construction contracts would require that construction equipment and activities comply with state and local noise regulations.

**Air Quality** Construction-related effects to air quality would be minimized by: 1) having emission control devices on all equipment; and 2) employing the use of best management practices to control wind erosion, including wetting of soils within the construction zone and minimizing soil disturbance during windy periods. Construction and maintenance of the proposed project would conform with air quality control regulations as established by the Clean Air Act, the Arizona Department of Environmental Quality, and Maricopa County.

**Cultural Resources** If either action alternative is selected but prior to signing the final decision, an archaeological survey of areas to be affected by construction of a captive-breeding pen, a holding pen, and associated developments (*e.g.* wildlife waters, forage plots, wells, or irrigation lines) would be undertaken. All consultation with the Arizona State Historic Preservation Officer under Section 106 of the National Historic Preservation Act, as well as consultation with tribal groups,

would be completed before a Finding of No Significant Impact is issued.

Should previously-undiscovered artifacts or features be unearthed during construction, work would be stopped in the immediate vicinity of the find, a determination of significance made, and a mitigation plan formulated in consultation with the Arizona State Historic Preservation Officer and with Native American entities that may have interests in the project area.

**Vegetation** Surveys of any proposed construction sites would be conducted to determine the presence of any special-status plant cactus species. If any are located, they would be avoided or translocated with a proper permit from the Arizona Department of Agriculture.

To prevent introduction and establishment of invasive plant species, all construction equipment would be cleaned with a high-pressure water jet before entering the project area. Also, weed-free hay would be used for supplemental feed. All disturbed areas would be monitored following construction to detect the occurrence of invasive plant species. If any are found, appropriate measures would be taken to eliminate them.

**Wildlife** All areas proposed for construction would be surveyed for special-status species (*i.e.* banded Gila monster [Area A], Sonoran desert tortoise [areas A and D], and Mexican rosy boa [Area D]) prior to any work being conducted. Kofa NWR special operating procedures and BLM regulations for construction in desert tortoise habitat would be adhered to (*e.g.* fencing off pooled runoff water, checking under vehicles before operating).

All wildlife waters would be fitted with escape ramps to prevent small animals from drowning. If any trenching is conducted, trenches would either be covered at the end of the work day or a ramp

would be placed in the trench to allow animals to escape. Trenches would be checked and any animals would be removed prior to being covered.

Construction activities would avoid effects to migratory birds to the extent possible in compliance with the Migratory Bird Treaty Act. Proposed pen site perimeters would be surveyed for nesting birds prior to construction. Nest sites located along proposed fence alignments would be avoided or would be taken only with a migratory bird permit from the U.S. Fish and Wildlife Service, Region 2, Migratory Bird Permit Office (505-248-7882). In any event, any active nests of raptor species found along the proposed fence alignments would be avoided by adjusting the fence location.

## 2.4 Monitoring and Adaptive Management Plan

A monitoring and adaptive management plan for implementation of the selected alternative would be developed by the Sonoran pronghorn Recovery Team prior to stocking a captive-breeding pen with Sonoran pronghorn. The purpose of the plan would be two-fold: 1) to identify management questions that need to be answered; and 2) to collect data needed to assess whether or not the actions being implemented were actually meeting the project objectives. Monitoring would be conducted by a subset of the Recovery Team. The plan would include a goal and objectives, methods, and evaluation procedures.

## 2.5 Comparison of Alternatives

The relative effects of each of the alternatives, including the No Action alternative, on resource categories analyzed in the EA are summarized in Table 4. The table provides an overview of the analysis and a comparison of the alternatives.

**Table 4.** Summary of potential effects on resource categories from each alternative.

RESOURCE CATEGORY	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
Conservation Status of Sonoran Pronghorn	<ul style="list-style-type: none"> <li>• 2,437 square miles of potential habitat for Sonoran pronghorn (CART Model)</li> <li>• Would <u>not</u> contribute to meeting all downlisting criteria</li> <li>• No potential for successful reestablishment of a second population</li> </ul>	<ul style="list-style-type: none"> <li>• 7,405 square miles of potential habitat for Sonoran pronghorn (CART Model)</li> <li>• Would contribute to meeting all downlisting criteria</li> <li>• High potential for successful reestablishment of a second population</li> <li>• Potential for establishment of two additional populations within historic range in areas A and D</li> </ul>	<ul style="list-style-type: none"> <li>• 3,939 square miles of potential habitat for Sonoran pronghorn (CART Model)</li> <li>• Would contribute to meeting all downlisting criteria</li> <li>• Moderate potential for successful establishment of a second population</li> <li>• Potential for establishment of one additional population within historic range in Area D</li> </ul>
Wildlife, Including Special-Status Animal Species	<ul style="list-style-type: none"> <li>• No habitat disturbed beyond existing conditions</li> <li>• No change regarding special-status animal species</li> <li>• No effects on federal candidate, proposed, or listed animal species or critical habitat beyond existing conditions</li> </ul>	<ul style="list-style-type: none"> <li>• 20 acres of creosotebush-bursage habitat would be disturbed</li> <li>• Three animal species of concern potentially affected</li> <li>• May affect, not likely to adversely affect Lesser Long-nosed Bat and Sonoran Pronghorn; no critical habitat affected</li> <li>• Water developments in Area A outside of pen may benefit mule deer and other wildlife</li> <li>• No predator control outside of pens in areas A or D is proposed</li> </ul>	<ul style="list-style-type: none"> <li>• 15 acres of creosotebush-bursage habitat would be disturbed</li> <li>• Two species of concern potentially affected</li> <li>• May affect, not likely to adversely affect Lesser Long-nosed Bat and Sonoran Pronghorn; no critical habitat affected</li> <li>• No predator control outside of pen in Area D is proposed</li> </ul>

Table 4, continued

RESOURCE CATEGORY	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
Vegetation, Including Special-Status Plant Species	<ul style="list-style-type: none"> <li>• No habitat disturbed beyond existing conditions</li> <li>• No change regarding special-status plant species</li> <li>• No effects on federal candidate, proposed, or listed plant species or critical habitat beyond existing conditions</li> <li>• No change regarding distribution, abundance, and population trends of invasive plant species</li> </ul>	<ul style="list-style-type: none"> <li>• 20 acres of creosotebush-bursage habitat would be disturbed</li> <li>• Eight plant species of concern potentially affected</li> <li>• No effects on federal candidate, proposed, or listed plant species or critical habitat</li> <li>• Low potential for colonization of disturbed areas by Sahara mustard or buffel grass at Area D pen site.</li> </ul> <p>Low potential for colonization of disturbed areas by buffel grass, high potential for colonization of disturbed areas by Sahara mustard at pen site in Area A</p>	<ul style="list-style-type: none"> <li>• 15 acres of creosotebush-bursage habitat would be disturbed</li> <li>• Six plant species of concern potentially affected</li> <li>• No effects on federal candidate, proposed, or listed plant species or critical habitat</li> <li>• Low potential for colonization of disturbed areas by Sahara mustard or buffel grass at pen site in Area D</li> </ul>
Water	<ul style="list-style-type: none"> <li>• No change regarding water uses from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>• 14.84 acre-feet/year of water may be used for wildlife waters and irrigation of forage plots within the captive-breeding pen in Area A, wildlife waters outside pen in Area A, and water inside holding pen in Area D</li> </ul>	<ul style="list-style-type: none"> <li>• 14.78 acre-feet/year of water may be used for wildlife waters and irrigation of forage plots within the captive-breeding pen in Area D</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• No change regarding air quality effects from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary, periodic increases in fugitive dust, PM<sub>10</sub> particulates, and carbon monoxide from construction and operation of pens in areas A and D</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary, periodic increases in fugitive dust, PM<sub>10</sub> particulates, and carbon monoxide from construction and operation of pen in Area D</li> </ul>
Noise Levels	<ul style="list-style-type: none"> <li>• No change regarding noise effects from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary, periodic increases in noise levels associated with construction and operation of pens in areas A and D</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary, periodic increases in noise levels associated with construction and operation of pen in Area D</li> </ul>

Table 4, continued

RESOURCE CATEGORY	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
Socioeconomic Conditions and Environmental Justice	<ul style="list-style-type: none"> <li>No change regarding socioeconomic effects from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>No effect on community services or community cohesion</li> <li>No measurable detrimental effects are anticipated in regards to communities or individuals</li> <li>No disproportionate adverse effects on low-income or minority populations</li> <li>Two full-time technical staff jobs created with Arizona Game and Fish Department in Yuma, would cost about \$55,000 year</li> <li>Implementation would cost about \$2.24 million over 10-year period</li> </ul>	<ul style="list-style-type: none"> <li>No effect on community services or community cohesion</li> <li>No measurable detrimental effects are anticipated in regards to communities or individuals</li> <li>No disproportionate adverse effects on low-income or minority populations</li> <li>Two full-time technical staff jobs created with Arizona Game and Fish Department in Ajo, would cost about \$55,000 year</li> <li>Implementation would cost about \$1.98 million over 10-year period</li> </ul>
Cultural Resources	<ul style="list-style-type: none"> <li>No change regarding effects on cultural resources from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>An archaeological survey of areas to be affected by pen construction and associated developments would be undertaken and all consultation with the Arizona State Historic Preservation Officer and the tribal groups would be completed before a Finding of No Significant Impact is issued</li> </ul>	<ul style="list-style-type: none"> <li>An archaeological survey of areas to be affected by pen construction and associated developments would be undertaken and all consultation with the Arizona State Historic Preservation Officer and tribal groups would be completed before a Finding of No Significant Impact is issued</li> </ul>

Table 4, continued

RESOURCE CATEGORY	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
Recreation, Wilderness, and Public Access	<ul style="list-style-type: none"> <li>No change regarding effects on recreation, Wilderness, and public access from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>No effects on public access</li> <li>Small visual impact to part of Kofa Wilderness from 320-acre pen on Kofa NWR, located ca. 5-6 air-miles from crest of Kofa Mtns.</li> <li>Occasional helicopter flights over Kofa Wilderness associated with operation of captive-breeding pen would cause periodic increases in noise disturbance</li> <li>Bi-monthly airplane surveys (1,000-ft altitude) would cause temporary increases in noise disturbance over potential habitats in Wilderness areas</li> <li>Restoration of Sonoran pronghorn, a native species, to potential habitats in eight Wilderness areas in Area A may enhance visitor experience</li> </ul>	<ul style="list-style-type: none"> <li>No effects on public access</li> <li>Restoration of Sonoran pronghorn, a native species, to Wilderness area (portions of Table Top Wilderness) may enhance visitor experience</li> <li>Bi-monthly airplane surveys (1,000-ft altitude) would cause temporary increases in noise disturbance over potential habitat in Table Top Wilderness</li> </ul>
Military Operations	<ul style="list-style-type: none"> <li>No change regarding effects on military operations from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>No effect on military operations through Endangered Species Act because affected portions of Barry M. Goldwater Range-East and Yuma Proving Ground would be within nonessential experiment population area</li> <li>Pronghorn may be taken within the nonessential experimental population area when it is incidental to, and not the purpose of, carrying out an otherwise lawful activity on Barry M. Goldwater Range-East and Yuma Proving Ground</li> </ul>	<ul style="list-style-type: none"> <li>No effect on military operations through Endangered Species Act because affected portions of Barry M. Goldwater Range-East would be within nonessential experiment population area</li> <li>Pronghorn may be taken within the nonessential experimental population area when it is incidental to, and not the purpose of, carrying out an otherwise lawful activity on Barry M. Goldwater Range-East</li> </ul>

Table 4, continued

RESOURCE CATEGORY	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III
Livestock Grazing	<ul style="list-style-type: none"> <li>No change regarding effects on livestock grazing from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>No effect on livestock grazing through ESA because affected BLM grazing allotments, private lands, and tribal lands would be within nonessential experiment population area</li> <li>Pronghorn may be taken within the nonessential experimental population area when it is incidental to, and not the purpose of, carrying out an otherwise lawful activity on BLM lands, private lands, and tribal lands</li> <li>BLM may reduce livestock permitted for grazing in a given year or possibly reduce ephemeral permits issued if Sonoran pronghorn are utilizing forage of a given allotment</li> </ul>	<ul style="list-style-type: none"> <li>No effect on livestock grazing through ESA because affected BLM grazing allotments, private lands, and tribal lands would be within nonessential experiment population area</li> <li>Pronghorn may be taken within the nonessential experimental population area when it is incidental to, and not the purpose of, carrying out an otherwise lawful activity on BLM lands, private lands, and tribal lands</li> <li>BLM may reduce livestock permitted for grazing in a given year or possibly reduce ephemeral permits issued if Sonoran pronghorn are utilizing forage of a given allotment</li> </ul>
Hazardous Materials	<ul style="list-style-type: none"> <li>No change regarding effects on hazardous materials from Sonoran pronghorn conservation</li> </ul>	<ul style="list-style-type: none"> <li>No effect on hazardous materials as none are known to be present at pen sites in areas A or D</li> </ul>	<ul style="list-style-type: none"> <li>No effect on hazardous materials as none are known to be present at pen site in Area D</li> </ul>

---

## 3.0 EXISTING CONDITIONS AND EFFECTS

This chapter describes aspects of the environment that may potentially be affected by reestablishment of one or more Sonoran pronghorn populations in historic range in Arizona. Potential effects of reestablishment actions proposed for each alternative are described for the various resource categories. Resource categories addressed in the analysis were selected based on issues identified during public and interagency scoping and conservation considerations for Sonoran pronghorn. Reestablishment of additional populations of Sonoran pronghorn may have effects on conservation of Sonoran pronghorn and various land uses or activities that have a federal nexus (*e.g.* land uses or activities that are proposed by a federal agency, require federal permitting, or are federal funded).

### 3.1 Assessment of Impacts

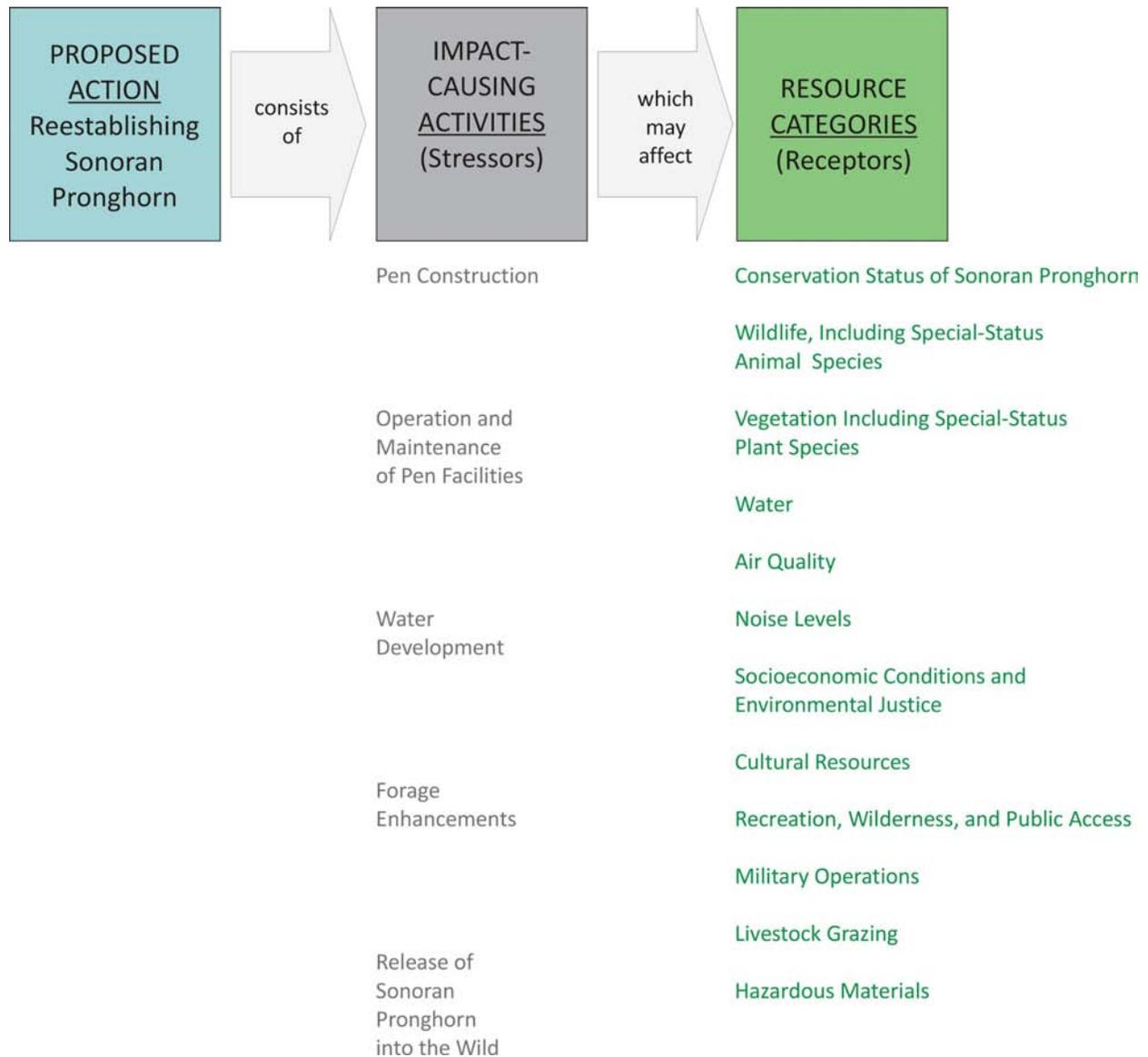
#### 3.1.1 Impact Assessment Method

Alternatives for reestablishing populations of Sonoran pronghorn within its historic range consist of several impact-causing activities, or stressors. Each of these stressors may or may not potentially affect various aspects of the resource categories, or receptors (Figure 14). Some resources are most sensitive to construction and operation of a captive-breeding or holding pen while other resources are more sensitive to the presence of Sonoran pronghorn in the wild. These effects pathways determine the geographic area of analysis for a specific aspect of a resource category. For example, special-status plant species would potentially be affected by

construction of pen facilities, which limits the geographic scope of the analysis to the area of ground that would be disturbed by each alternative. On the other hand, potential effects to livestock grazing would most likely arise from the presence of Sonoran pronghorn. Consequently, the geographic area of analysis for that resource encompasses the entire area that Sonoran pronghorn may occupy. The focus of the existing condition descriptions for each resource, therefore, is related to the area of analysis for that resource.

The time frame for the analysis in this EA is approximately 10 years from the signing of the final decision and beginning of implementation of the various project components. This time frame accounts for one year to build and stock a captive-breeding pen and about two years to raise the first Sonoran pronghorn for release into the wild. Subsequent annual releases of two-year-old pronghorn would continue for five to seven years, depending on success of establishing a second population. The 10-year time frame also includes the possibility of periodic releases of adult pronghorn from the Cabeza Prieta NWR captive-breeding pen, as well as allowing for monitoring and adapting captive-breeding and release activities based on knowledge that is acquired each year.

**Figure 14.** Cause and effect diagram for impact assessment. Sonoran pronghorn released into the wild would be classified as nonessential experimental under section 10(j) of the ESA.



### 3.1.2 Ramifications of Nonessential Experimental Population Designation

As described in sections 2.1.2 and 2.2.4, Sonoran pronghorn released under either of the action alternatives (*i.e.* alternatives II and III) would be classified as nonessential experimental populations. This designation would have the effect of relaxing the ESA section 9 prohibition of take, which greatly reduces the potential effects on private landowners and federal agencies from releasing Sonoran pronghorn into the wild within the nonessential experimental population area. As discussed in section 2.2.4, any take of Sonoran pronghorn in the nonessential experimental population area (Figure 13) that is associated with otherwise lawful activities would not be prohibited. Consequently, potential effects of ongoing, lawful, land use activities within the nonessential experimental population area (*e.g.* military training exercises) would not be affected through the ESA by the presence of Sonoran pronghorn.

## 3.2 Conservation Status of Sonoran Pronghorn

### 3.2.1 Existing Conditions

Existing conditions for conservation status of Sonoran pronghorn are defined as continuation of the current conservation efforts with no attempt to reestablish additional populations. Under this scenario, Sonoran pronghorn would continue to be listed as endangered under the ESA but no populations would be designated as experimental and nonessential under section 10(j) of the ESA. Current conservation efforts for Sonoran pronghorn can be categorized into two main categories: 1) management of the wild population within the current U.S. range and 2) operation of

the captive-breeding pen at Cabeza Prieta NWR, which includes release of animals within the current U.S. range. These two categories of ongoing conservation efforts are discussed in greater detail below.

#### 3.2.1.1 Management of Wild Population Within Current U.S. Range

Pronghorn throughout Arizona, including Sonoran pronghorn, experienced marked declines in abundance and range contraction concurrent with settlement from the mid-1880's to the early 1900s (Brown and Ockenfels, 2007: 70). The need for conservation actions to stem the decline of pronghorn was realized in 1913, when a moratorium on hunting pronghorn in Arizona took effect (Brown and Ockenfels, 2007: 74). However, the moratorium was ineffective and pronghorn numbers continued to decline into the early 1920s due to habitat degradation and widespread hunting and harvest of the animals (Brown and Ockenfels, 2007: 75).

The first substantive management action affecting Sonoran pronghorn was withdrawal of about 2.5 million acres of public land from 1937 to 1943 for establishment of the Cabeza Prieta Game Range (now Cabeza Prieta NWR, in 1939), Organ Pipe Cactus NM (in 1937), and Luke-Williams Gunnery Range (now BMGR, from 1941 through 1943). This land withdrawal led to the stabilization of the much-reduced U.S. population of Sonoran pronghorn through conservation of a large undeveloped area (Phelps, 1981*b*; U.S. Fish and Wildlife Service, 2006: 6). The public land withdrawal area contains over 90 percent of the current U.S. range of Sonoran pronghorn (Table 5).

**Table 5.** Land status within the current U.S. range of Sonoran pronghorn. Approximately 0.5 square miles of land managed by the U.S. Bureau of Reclamation are also within the current U.S. range.

LAND STATUS	LAND AREA	
	square miles	percent of total
Cabeza Prieta NWR	1,142	41.6%
Barry M. Goldwater Range	1,071	39.0%
Organ Pipe Cactus NM	336	12.2%
Bureau of Land Management	121	4.4%
Private	40	1.5%
State Trust	34	1.2%
<b>TOTAL</b>	<b>2,744</b>	

In March 1967, Sonoran pronghorn was federally listed as endangered (32 Federal Register 4001). By that time, the U.S. population had declined to less than 50 animals (Bright and Hervert, 2005: 43). That same year, a study was initiated by the Arizona Game and Fish Department to investigate the natural history of Sonoran pronghorn (Arizona Game and Fish Department, 1981: 1). This marked the first systematic inquiry into the distribution, status, habitat, diet, and life history of Sonoran pronghorn. The data from these investigations led to the conclusion that the only options for improving the conservation status of Sonoran pronghorn were to increase population density or range, but research to support development of these options was deemed to be the first and highest priority (Arizona Game and Fish Department, 1981: 52).

Eight years after listing of Sonoran pronghorn, a Sonoran pronghorn recovery team was convened (U.S. Fish and Wildlife Service, 1998: 23). The team produced the first recovery plan for Sonoran pronghorn in 1982, following publication of the results of natural history studies (Arizona Department of Game and Fish, 1981). The

recovery plan for Sonoran pronghorn was revised in 1994 (O'Brien *et al.*, 2005: 25) and again in a final revision in 1998 (U.S. Fish and Wildlife Service, 1998) to incorporate significant amounts of new information about Sonoran pronghorn obtained from ongoing research. The 1998 plan was supplemented and amended in 2002 to refine the recovery criteria and schedule (U.S. Fish and Wildlife Service, 2003a). Based on the final revised recovery plan, Sonoran pronghorn will be considered for downlisting from endangered to threatened when 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 five-year period or numbers are determined to be adequate to sustain the population through time (U.S. Fish and Wildlife Service, 1998: 37).

In order to most efficiently move toward achieving these criteria, the amendment to the recovery plan (U.S. Fish and Wildlife Service, 2003a: 38) outlined the following eight general recommendations for focusing near-term recovery efforts:

- 1) improve habitat for fawn survival and recruitment through the establishment and evaluation of forage enhancement plots on BMGR-East;
- 2) initiate a quantitative evaluation of Sonoran pronghorn use and reliance on sources of free water (both temporary and permanent);
- 3) reduce predation through selective removal of coyotes from specific areas and at times of the year when adult female pronghorn are most susceptible to predation;
- 4) evaluate potential transplant locations, establish relocating methods and protocols, develop interagency agreements (including Mexico as required), acquire funding, and initiate reestablishment projects;
- 5) increase frequency and expand scope of aerial monitoring in Mexico to improve comparability with U.S. surveys;
- 6) investigate potential Sonoran pronghorn disease vectors;
- 7) reduce disturbance at critical times of the year; and
- 8) investigate and reduce movement barriers.

Investigation of Sonoran pronghorn life history was initiated in 1983 (U.S. Fish and Wildlife Service, 1998: 23). Research on ecology of Sonoran pronghorn continued through the 1990s (U.S. Fish and Wildlife Service, 1998: 23-27) and is ongoing. Aerial surveys to estimate the size of the U.S. population were initiated in 1992 and radio-tracking studies began in 1994 (U.S. Fish and Wildlife Service, 1998: 25; U.S. Fish and Wildlife Service, 2006: 44). Important research findings on fawn and adult survival, habitat use, movements, use of water, and home range were published in 2005 (see Krausman *et al.*, 2005).

About 93 percent of the current U.S. range of Sonoran pronghorn is within Cabeza Prieta NWR (41.6 percent), BMGR-East (39 percent), and Organ Pipe Cactus NM (12.2 percent; Table 5). A

captive-breeding and translocation program for Sonoran pronghorn has been implemented on Cabeza Prieta NWR and is described below in section 3.2.1.2. Other management actions for conservation of Sonoran pronghorn within the current U.S. range include population monitoring, development and maintenance of wildlife waters, area closures, supplemental feeding and forage enhancements, and removing or modifying barriers to movement of Sonoran pronghorn (U.S. Fish and Wildlife Service, 2006: 43-50).

**Population Monitoring** Population monitoring is a joint effort by Cabeza Prieta NWR and the Arizona Game and Fish Department. It consists of aerial surveys conducted every two years to estimate the size of the U.S. population and aerial tracking of radio-collared animals (U.S. Fish and Wildlife Service, 2006: 44). Monitoring of Sonoran pronghorn to reduce impacts of military training activities was initiated in 1998 on BMGR-East (Harris Environmental Group, Inc., 1999) and continues to the present time. Monitoring is conducted at the North and South tactical ranges (NTAC and STAC, respectively) during the following times: prior to live ordnance missions; every Monday; the day after a Sonoran pronghorn is located on a range; prior to live-Maverick missile missions; and prior to any munitions detonation (U.S. Air Force, 2008: 3-53). Organ Pipe Cactus NM also monitors Sonoran pronghorn on its lands and closes areas within a five-mile diameter of known locations (U.S. Fish and Wildlife Service, 2003b: 33).

**Water Developments** There are 22 developed surface water sources within habitat of Sonoran pronghorn on Cabeza Prieta NWR (U.S. Fish and Wildlife Service, 2006: 45). One of these, the Chico Shunie well with associated tank and trough, currently is not functioning. Another, Bassarisc tank, is infrequently used by Sonoran pronghorn. Another nine are emergency waters that are filled with hauled water. Of the remaining 11 sites, nine

require at least some hauling to maintain surface water (U.S. Fish and Wildlife Service, 2006: 45). In the summers of 2001 and 2002, three small, temporary water facilities were placed on Cabeza Prieta NWR and monitored for use by Sonoran pronghorn. The project demonstrated that Sonoran pronghorn will use free water (U.S. Fish and Wildlife Service, 2003a: 40-41; U.S. Fish and Wildlife Service, 2006: 46). An emergency water source was developed on Organ Pipe Cactus NM (U.S. Fish and Wildlife Service, 2006: 46). However, it is currently not functioning and has been abandoned due to design flaws (J. Hervert, Arizona Game and Fish Department, pers. comm.).

**Area Closures** Since 2002, about 75 percent of Cabeza Prieta NWR, from the eastern boundary to near Tule Well, has been closed to public use from 15 March to 15 July to minimize human disturbance of Sonoran pronghorn during the fawning period (U.S. Fish and Wildlife Service, 2006: 49). San Cristobal Valley on BMGR-East is closed to all recreation uses due to the military training mission that occurs there. Access is allowed only with a special use permit, and no access by special use permit is allowed during the 15 March to 15 July fawning period (U.S. Fish and Wildlife Service, 2003c: 15). Additionally, 163 miles of road were closed on BMGR-East, and another 32 miles are seasonally closed, to protect Sonoran pronghorn (U.S. Fish and Wildlife Service, 2001: 13). The portion of the current U.S. range of Sonoran pronghorn within BMGR-West is also closed to all recreational uses from 15 March through 15 July (D. Garcia, Luke AFB, pers. comm., 17 July 2009). Organ Pipe Cactus NM closes backcountry areas west of S.R. 85 and several roads from 15 March to 31 July in dry years and 30 April to 31 July in wet years to protect Sonoran pronghorn during the fawning period (U.S. Fish and Wildlife Service, 2005: 6). BLM lands west of S.R. 85 and south of the Chico Shunie Road, except for the Gunsight Wash

campground area, area also closed from 15 March to 15 July. Seasonal closures may be relaxed when habitat conditions are good, based on a determination made by the Service.

**Forage Enhancements** Forage enhancements for Sonoran pronghorn were implemented as an emergency response to improve fawn survival (Hervert *et al.*, 2001) and stem the severe decline of the U.S. population that occurred from 2000 to 2002. Four forage enhancements have been established outside of the Cabeza Prieta NWR captive-breeding pen. Three of these are located in the Childs Valley in non-wilderness areas on Cabeza Prieta NWR and one is on BMGR-East (U.S. Fish and Wildlife Service, 2006: 50). Forage enhancements generally encompass an area of about six acres which are irrigated using sprinklers and flood/drip irrigation during years with below-normal precipitation. Irrigation is used to simulate normal precipitation volumes and seasonal patterns. A new forage enhancement plot is planned on BMGR-West (Arizona Game and Fish Department, 2008a).

**Barrier Removal or Modification** Fencing was removed from water sources and selected boundary areas at Cabeza Prieta NWR from the late 1980s through the late 1990s (U.S. Fish and Wildlife Service, 1998: 29) to facilitate movement of Sonoran pronghorn, reduce habitat fragmentation, and make water sources more suitable. By 2003, the livestock fence between Organ Pipe Cactus NM and Cabeza Prieta NWR was removed and the livestock fence along the north boundary of Organ Pipe Cactus NM was modified for Sonoran pronghorn (U.S. Fish and Wildlife Service, 2003b: 33). Fence modification consists of replacing the bottom strand of the fence with smooth wire and placing it at least 18 inches above the ground (U.S. Fish and Wildlife Service, 2006: 50).

### 3.2.1.2 Operation of the Captive-Breeding Pen at Cabeza Prieta NWR

Emergency recovery actions were implemented following the precipitous decline of the U.S. population of Sonoran pronghorn during the severe drought of 2002 (*cf.* Table 1). Chief among these emergency actions was development of a captive-breeding pen at Cabeza Prieta NWR. A 640-acre captive-breeding pen was constructed in the winter of 2003. The pen consists of perimeter fencing to contain Sonoran pronghorn and exclude predators, four sources of drinking water, and several irrigated forage areas (U.S. Fish and Wildlife Service, 2006: 49). Mineral blocks and supplemental feed are also provided as needed.

The pen was initially stocked with two females in January 2004 (Arizona Game and Fish Department, 2004*b*) and a male in April 2004 (Arizona Game and Fish Department, 2004*c*). Four more does were captured and moved into the pen in December 2004, and all four were found to be pregnant (Arizona Game and Fish Department, 2004*d*). Ten fawns were born in March and April 2005 (Arizona Game and Fish Department, 2005*a*). Four of the fawns died in July 2005 (Arizona Game and Fish Department, 2005*b*). In December 2005, three females were captured from the U.S. population and were moved to the pen. Supplemental feeding with alfalfa hay was also initiated in December 2005 after noting that natural forage was becoming scarce in the enclosure (Arizona Game and Fish Department, 2005*c*). By the end of 2005, the captive breeding population numbered 15 Sonoran pronghorn (nine captured from the wild and six born in the pen).

In January 2006, one male and three female Sonoran pronghorn were captured in Mexico and moved into the pen (Arizona Game and Fish Department, 2006*b*). Nine fawns were born in March and April 2006 (Arizona Game and Fish Department, 2006*c*). The first release of Sonoran

pronghorn from the captive-breeding pen was made in November 2006, consisting of two yearling males (Arizona Game and Fish Department, 2006*d*). The two released males had joined with wild Sonoran pronghorn by January 2007 (Arizona Game and Fish Department, 2007*b*). Two more yearling males were also released from the pen in January 2007 (Arizona Game and Fish Department, 2007*c*).

Eighteen fawns were born in the captive-breeding pen in spring 2007 (Arizona Game and Fish Department, 2007*d*). One yearling buck died in July 2007 after having gotten tangled in a gap between the shade cloth and the perimeter fence (Arizona Game and Fish Department, 2007*e*) and an adult buck died in August 2007 from epizootic hemorrhagic disease (Arizona Game and Fish Department, 2007*f*). Two yearling males died in February 2008 during attempts to move them within the captive-breeding pen (Arizona Game and Fish Department, 2008*b*). Five yearling males were released from the pen into the wild in March 2008 (Arizona Game and Fish Department, 2008*c*) and 27 fawns were produced in spring 2008 (Arizona Game and Fish Department, 2008*d*). Three of the males released in 2008 drowned in an irrigation canal near Gila Bend in May 2008 (Arizona Game and Fish Department, 2008*d*). Another male born in spring 2008 died in the captive-breeding pen in July (Arizona Game and Fish Department, 2008*a*) and in August a yearling male and female fawn died in the pen, possibly from epizootic hemorrhagic disease (Arizona Game and Fish Department, 2008*e*).

Three juvenile males were released from the captive-breeding pen in December 2008 into the wild. Two of the males were killed by coyotes within four days of their release in the Childs Valley. Another five Sonoran pronghorn were released into the wild in January 2009, near the Charlie Bell Pass in hopes that the animals would move into the Growler Valley and join wild herds

(Arizona Game and Fish Department, 2009a). One female was killed by coyotes the following evening and the rest moved back into the Childs Valley (Arizona Game and Fish Department, 2009a) and another male died during an attempt to relocate him in February 2009 (Arizona Game and Fish Department, 2009b).

Three males were removed from the captive-breeding pen, flown by helicopter to the Growler Valley, and released there in February 2009 (Arizona Game and Fish Department, 2009b). Another adult buck which was no longer needed for breeding was removed from the breeding pen and released onto land adjacent to the pen in February 2009 (J. Bright, Arizona Game and Fish Department, pers. comm., 27 July 2009).

In summary, the captive-breeding pen has recruited 86 Sonoran pronghorn and enabled the release of 21 animals into the wild (Table 6). Sonoran pronghorn were released within two years of initial stocking of the pen. There have been seven mortalities within the pen over the six years that it has been operational: one was from epizootic hemorrhagic disease, two were associated with capturing and moving animals, two were from malnutrition prior to using supplemental feeding, one was from entanglement in shade cloth and fence, and one was from unknown causes (J. Bright, Arizona Game and Fish Department, pers. comm., 27 July 2009). Of the 21 released animals, there are seven known mortalities: three from drowning in an irrigation canal, three from coyote predation, and one from stress associated with a relocation attempt. Thus, the captive-breeding pen has served to augment the wild population of Sonoran pronghorn by 14 animals. The majority of these animals have been released in the last two years (Table 6).

**Table 6.** Sonoran pronghorn recruitment and release from the captive-rearing pen, 2004-2009. Data are from Arizona Game and Fish Department monthly status reports, as discussed in the text and personal communication with J. Atkinson, Cabeza Prieta NWR.

YEAR	CAPTURED AND ADDED TO PEN	RECRUITMENT	RELEASED	TOTAL IN PEN
2004	7 (6♀, 1♂)	---	---	7
2005	3 (3♀)	6	---	15
2006	4 (3♀, 1♂)	9	2	25
2007	0	16	2	37
2008	0	25	8	51
2009*	1 (1♂)	30*	9	73
<b>TOTALS</b>	<b>15 (12♀, 3♂)</b>	<b>86</b>	<b>21</b>	

\* As of July 2009

### 3.2.2 Effects on Conservation Status of Sonoran Pronghorn

The following factors were selected by the interdisciplinary team as important indicators of impact on conservation of Sonoran pronghorn (Blue Earth Ecological Consultants, Inc., 2009b: 16). Therefore, these factors were used to measure the effects of the alternatives on conservation status of Sonoran pronghorn. The factors are:

- total amount of potential habitat available to Sonoran pronghorn, derived from the logistic regression and Classification and Regression Tree landscape-level models of potential habitat for Sonoran pronghorn (O'Brien *et al.*, 2005);
- contribution to meeting the downlisting criteria (*i.e.* a population size of 300 animals within the current U.S. range and establishing a second, separate population); and
- probability of successfully establishing a second, separate population in a reintroduction area, involving consideration of current land uses, human disturbance, disease, predation, precipitation characteristics, forage quality, and water sources.

The total amount of potential habitat for each alternative was derived by extracting habitat modeled and mapped at the landscape level by O'Brien and others (2005) within the current U.S. range, Area A, and Area D. The extraction was conducted using three different habitat classifications: Classification and Regression Tree (CART) modeled habitat; logistic regression (LR) model habitat with probability of occupancy by Sonoran pronghorn of 0.5 or greater; and LR model habitat with probability of occupancy by Sonoran pronghorn of 0.75 or greater. The

modeling conducted by O'Brien and others (2005) included all of the action area except for about 24 percent (524 mi<sup>2</sup>) of the 2,159-mi<sup>2</sup> Area D. This non-modeled area was incorporated into the total by adding an amount of potential habitat under each of the three model scenarios on a proportional basis (Table 7).

Contribution to meeting the downlisting criteria was evaluated by assessing whether or not the alternative included establishing a second population. This factor basically addresses whether or not the alternative meets the project purpose and need. Management of the wild population within the current U.S. range was considered to be the same under all alternatives.

This is because none of the action alternatives include components that would substantially change the management of the wild population within the current U.S. range or operation of the captive-breeding pen at Cabeza Prieta NWR as described above under "Existing Conditions" in section 3.2.1.

Probability of successful establishment of a second population was evaluated largely in a qualitative manner using the professional knowledge and expert judgement of members of the interdisciplinary team. The qualitative evaluation was based on ID team members' knowledge of the ecological attributes of the action area, experience with the captive-breeding operation at Cabeza Prieta NWR, knowledge of factors affecting population dynamics of Sonoran pronghorn, and expertise in assessing habitat suitability and quality for Sonoran pronghorn.

**Table 7.** Extrapolation procedure for application of modeled habitat to all of Area D. Potential habitat modeled by O'Brien and others (2005) includes CART = Classification and Regression Tree and LR = logistic regression. The LR model was applied to determine potential habitat with a 50-percent or greater probability of occupancy by Sonoran pronghorn (column labeled 'LR Model 0.5 Probability') and the habitat area with a 75-percent or greater probability of occupancy (column labeled 'LR Model 0.75 Probability').

AREA D	LAND AREA (mi <sup>2</sup> )	POTENTIAL HABITAT FOR SONORAN PRONGHORN (mi <sup>2</sup> )		
		CART Model	LR Model 0.5 Probability	LR Model 0.75 Probability
Portion modeled	1,635	1,137 (69.58%)	1,140 (69.72%)	4.88 (0.31%)
Portion not modeled	524	524 x 69.58% = 365	524 x 69.72% = 365	524 x 0.31% = 1.64
Total area	2,159	1,137 + 365 = <b>1,502</b>	1,140 + 365 = <b>1,505</b>	4.88 + 1.64 = <b>6.52</b>

**3.2.2.1 Alternative I** Under the Alternative I (No Action), conservation of Sonoran pronghorn would consist only of the ongoing management of animals within the current U.S. range as described in the existing conditions for conservation of Sonoran pronghorn (section 3.2.1). Consequently, the total amount of potential habitat available to Sonoran pronghorn would be limited to what is present within the current U.S. range (Table 8).

Potential habitat for Sonoran pronghorn as delineated by the CART model totals 2,437 square miles within the current U.S. range, which itself encompasses about 2,744 square miles. A lesser area, totaling 1,008 square miles, is defined by the LR model as having a 50-percent or greater chance of being occupied by Sonoran pronghorn. Only six square miles within the current U.S. range is defined by the LR model as being habitat with a 75-percent or greater chance of being occupied by Sonoran pronghorn (Table 8).

With selection of Alternative I, the status of Sonoran pronghorn would not be improved to the point that it would be considered for downlisting from endangered to threatened. This is because downlisting will be considered only when the existing U.S. population within the current range numbers at least 300 animals and a second, separate, stable population of sufficient size is established. With selection of Alternative I, a second, separate population would not be established through management efforts. The likelihood of a second, geographically isolated population becoming established through natural dispersal is extremely unlikely, given the current spatial configuration of natural and man-made barriers to movement.

**Table 8.** Potential habitat, in square miles, for Sonoran pronghorn under the three alternatives. The amount of potential habitat was derived from modeling and mapping by O'Brien and others (2005) and is shown for: the Classification and Regression Tree model (column labeled 'CART Model'); the logistic regression model with a probability of occupancy by Sonoran pronghorn of 50 percent or greater (column labeled 'LR Model 0.5 Probability'); and the logistic regression model with a probability of occupancy by Sonoran pronghorn of 75 percent or greater (column labeled 'LR Model 0.75 Probability').

ALTERNATIVE	TOTAL AMOUNT OF POTENTIAL HABITAT FOR SONORAN PRONGHORN (mi <sup>2</sup> )		
	CART Model	LR Model 0.5 Probability	LR Model 0.75 Probability
I - No Action	2,437	1,008	6
II - Captive Breeding Pen in Area A, Holding Pen in Area D	7,405	4,445	16
III - Captive Breeding & Holding Pen in Area D	3,939	2,514	13

**3.2.2.2 Alternative II** With selection of Alternative II, conservation of Sonoran pronghorn would expand in scope beyond the existing conditions to include construction and operation of both a captive-breeding pen at Kofa NWR (Area A) and a holding pen at BMGR-East (Area D; *cf.* section 2.2). Consequently, implementation of this alternative would potentially result in increasing the range of Sonoran pronghorn to include the current U.S. range, Area A, and Area D (Figure 15).

Potential habitat available to Sonoran pronghorn would increase substantially with Alternative II (Figure 15). Habitat delineated by the CART model would increase by 204 percent, from 2,437 mi<sup>2</sup> to 7,405 mi<sup>2</sup> (Table 8). Similarly, Alternative II would increase the quantity of potential habitat delineated by the logistic regression model. Potential habitat with a probability of occupancy by Sonoran pronghorn of 50 percent or greater would almost quadruple in extent (380-percent increase; Table 8). Habitat with a probability of occupancy of 75 percent or greater would increase 152 percent with Alternative II (Table 8). The

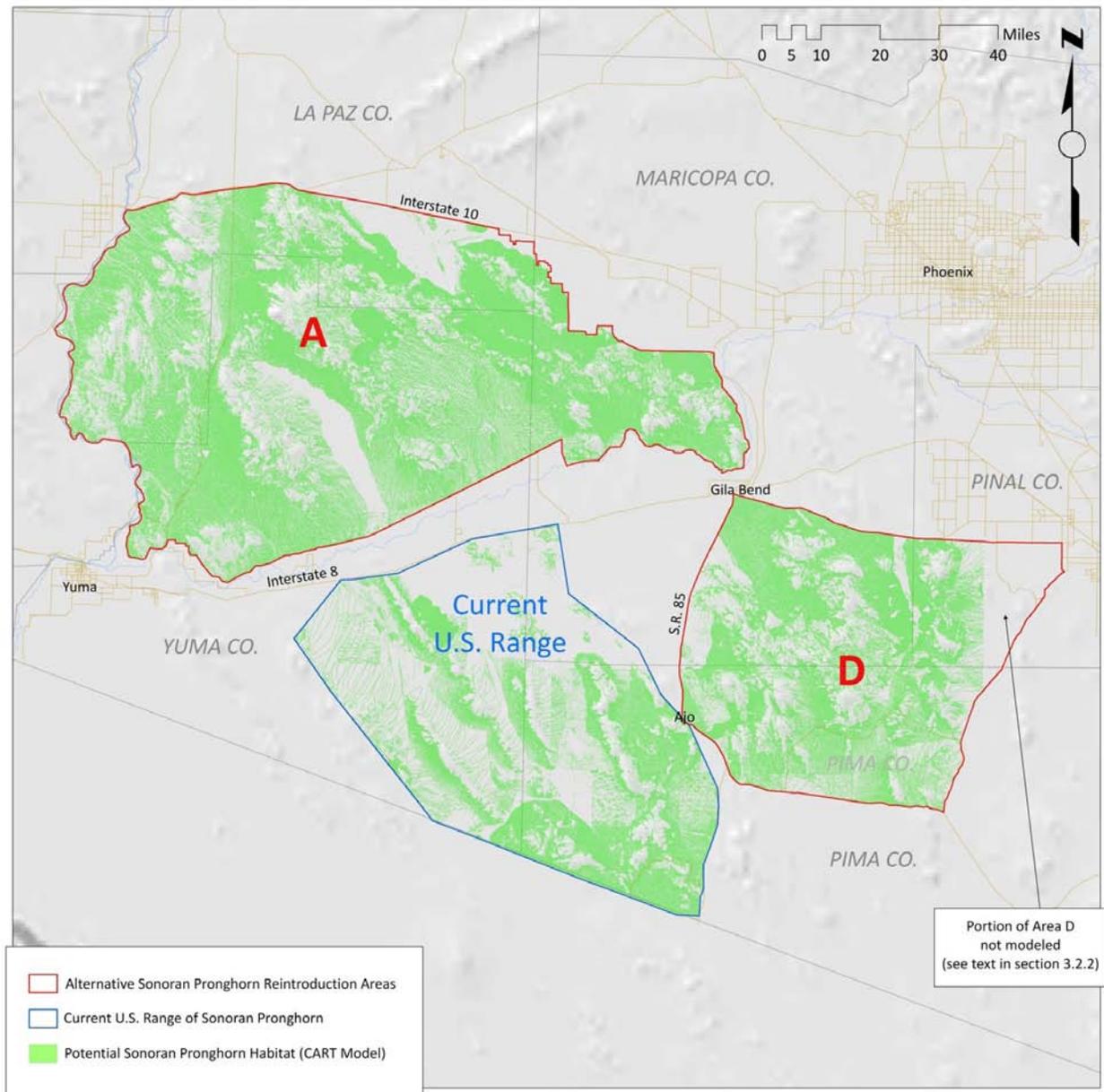
habitat area encompassed by Alternative II could potentially support a very large population of Sonoran pronghorn, considering the general habitat-population size relationship described Brown and Okenfels (2007: 26) of 200 mi<sup>2</sup> of suitable habitat required to support a viable, long-term population of 100 females in suboptimal habitats.

Alternative II would address the project's purpose and need by implementing a program to establish a second population of Sonoran pronghorn in Area A. The alternative would add a considerable degree of reassurance of establishing a second population by also including a program for releasing animals via a holding pen in Area D. Consequently, Alternative II would be a large contribution to meeting downlisting criteria.

Alternative II includes two areas for reintroduction of Sonoran pronghorn. These areas differ slightly in terms of variables considered important for successful reestablishment of a Sonoran pronghorn population. Average annual precipitation is higher in Area D than in Area A. Climate data from Kofa Mine, located in Area A,

indicate average annual precipitation of 6.94 inches (station 024702, 1952 through 2005; Western Regional Climate Center, 2009). In contrast, average annual precipitation at Ajo, located on the southwestern edge of Area D, is 8.4 inches (station 020080, 1914 through 2005; Western Regional Climate Center, 2009). Therefore, it is reasonable to conclude that the availability of nutritious, green forage may be higher in Area D. Precipitation is of great importance because it has a strong influence on fawn survival (Bright and Hervert, 2005), which in turn is a critical factor in determining population viability (Hosack *et al.*, 2002). The difference in average annual precipitation between areas A and D is ameliorated somewhat by the large land area and extent of potential habitat in Area A compared to Area D. The large land area in Area A would provide Sonoran pronghorn with the opportunity to freely move across the landscape to areas that have suitable forage and water. This is particularly important during the hot summer season when rainfall from convectional thunderstorms is patchy across the landscape. Area D includes bajada habitats with abundant chain-fruit cholla, which serve as a water source for Sonoran pronghorn during dry periods. Chain-fruit cholla is rare in Area A; however, Alternative II includes development of five water sources in non-wilderness areas outside of the captive breeding pen.

**Figure 15.** Potential habitat in the action area delineated using the CART model. Habitat available to Sonoran pronghorn under Alternative I would be limited to that within the current U.S. range. With Alternative II, potential habitat in all three areas (the current U.S. range, Area A, and Area D) would be available to Sonoran pronghorn. With Alternative III, potential habitat in the current U.S. range and Area D would be available to Sonoran pronghorn.



The extent of habitat fragmentation by major and minor highways is slightly higher in Area A than in Area D. Area A contains 69.22 miles of class 2 road (all of it U.S. Highway 95) and 6.99 miles of class 3 road, while Area D contains 38.59 miles of class 3 roads (ESRI, Inc., 2008: highways.sdc). Class 2 roads are paved surface highways including secondary state highways, primary county routes, and other highways that link principal cities and towns. Class 3 roads include paved roads and improved, all-weather loose-surface roads that are adjunct to the primary and secondary highway system. Both areas contain BLM livestock grazing allotments, which have attendant pasture fencing for management of domestic livestock. These fences can pose a barrier to movement of Sonoran pronghorn, depending upon fence construction. If it is assumed that the density of fencing is similar in allotments, Area A, with portions of 30 allotments encompassing about 1.3 million acres, would have more potential fragmentation by fencing than Area D, which contains portions of six allotments that encompass about 122,000 acres.

Disturbance from humans and ongoing land use activities are also important considerations in evaluating the potential for successful establishment of a population of Sonoran pronghorn. Sonoran pronghorn appear to habituate to noise from military overflights (U.S. Fish and Wildlife Service, 2003a: 14), but they are sensitive to ground-based human activity. Pronghorn are most sensitive to people on foot and slightly less so to people in vehicles. The distance at which flight response is initiated varies with topographic and vegetation features but generally occurs at least at about 600 feet (Fairbanks and Tullous, 2002; Taylor and Knight, 2003). Human foot and vehicle traffic in areas A and D is associated primarily with recreation, wildlife management, law enforcement, undocumented immigrant travel, and smuggling. The level of undocumented immigrant traffic,

smuggling activities, and law enforcement is higher in Area D than in Area A. For example, there have been about five cases of undocumented immigrant or smuggling arrests on Kofa NWR in Area A in the last several years (S. Henry, Kofa NWR Manager, pers. comm., 1 May 2009). In contrast there were 70 cases of apprehension of undocumented immigrants in a portion of Area D in 2008 alone (T. Walker, Luke AFB, pers. comm., 1 April 2009).

Finally, predation and disease are important considerations in potential for successful reestablishment of Sonoran pronghorn within its historic range. Bluetongue and epizootic hemorrhagic disease are found in both areas A and D, but the lower wild ungulate population in Area D (J. Hervert, Arizona Game and Fish Department, pers. comm., 11 February 2009) may suggest a higher prevalence of these viral diseases there (Blue Earth Ecological Consultants, Inc., 2009b: 16). However, the importance of disease as a mortality factor in Sonoran pronghorn in the wild is not known (Bright and Hervert, 2005). The main predators of Sonoran pronghorn are coyotes, bobcats, and mountain lions (Bright and Hervert, 2005). All three predator species are present in both areas. Predation by mountain lions would be most likely to occur only when Sonoran pronghorn are in rough mountainous terrain, which is infrequent, or when they occur in areas with dense vegetation cover, such as desert washes (U.S. Fish and Wildlife Service, 2003a: 23).

As described in section 2.1.2, removal of Sonoran pronghorn from the captive-breeding pen at Cabeza Prieta NWR for establishing additional populations would not harm the existing wild population within the current U.S. range. The wild population and the animals in the captive-breeding pen at Cabeza Prieta NWR are the primary species populations. The captive-breeding pen at Cabeza Prieta NWR would continue to function to add

animals to the existing wild population within the current U.S. range, thereby furthering its security. Reintroduced populations of Sonoran pronghorn would be genetically redundant with the primary species populations. Reintroductions would not reduce or degrade the existing repository of genetic diversity contained in the primary species populations. Finally, any Sonoran pronghorn lost through reintroduction efforts would be replaced by the captive-breeding program at the Cabeza Prieta NWR pen. Sonoran pronghorn within the current U.S. range would continue to be listed as endangered under the ESA.

**3.2.2.3 Alternative III** Alternative III includes construction and operation of a captive-breeding pen at Area D on BMGR-East (*cf.* section 2.2.3). There would be no efforts to establish Sonoran pronghorn in Area A.

Implementation of Alternative III would increase the amount of potential habitat available for Sonoran pronghorn to a lesser extent than Alternative II (Table 8). Habitat delineated by the CART model would increase 62 percent, from 2,437 mi<sup>2</sup> to 3,939 mi<sup>2</sup> (Table 8). Potential habitat with a probability of occupancy by Sonoran pronghorn of 50 percent or greater would increase by 149 percent and habitat with a probability of occupancy of 75 percent or greater would increase 106 percent with Alternative III (Table 8).

As with Alternative II, Alternative III would address the project's purpose and need by implementing a program to establish a second population of Sonoran pronghorn. However, unlike Alternative II which included two potential reintroduction areas, Alternative III would limit efforts to reestablish a second population of Sonoran pronghorn to one area: Area D. In this respect, Alternative III would still contribute to meeting downlisting criteria. However, the potential for success and the degree of improvement of conservation status of Sonoran

pronghorn would be less with Alternative III compared to Alternative II.

There are several factors associated with Area D that give rise to a higher degree of uncertainty regarding the potential for successful reestablishment of a second population of Sonoran pronghorn. First, as described above under Alternative II, the level of human disturbance is much higher in Area D than it is in Area A. The human disturbance is associated primarily with undocumented immigrant travel, smuggling, and law enforcement. While not likely to materially affect the operation of the captive-breeding pen, this higher level of human disturbance may influence the probability of survival of animals released into the wild. Another factor that may affect probability of success is disease. The low population density of other wild ungulates, such as mule deer (*Odocoileus hemionus*), has given rise to speculation that viral diseases such as bluetongue and epizootic hemorrhagic disease are more widespread and prevalent in Area D compared to Area A (J. Hervert, Arizona Game and Fish Department, pers. comm., 11 February 2009).

As described in section 2.1.2, removal of Sonoran pronghorn from the captive-breeding pen at Cabeza Prieta NWR for establishing additional populations would not harm the existing wild population within the current U.S. range. The wild population and the animals in the captive-breeding pen at Cabeza Prieta NWR are the primary species populations. The captive-breeding pen at Cabeza Prieta NWR would continue to function to add animals to the existing wild population within the current U.S. range, thereby furthering its security. Reintroduced populations of Sonoran pronghorn would be genetically redundant with the primary species populations. Reintroductions would not reduce or degrade the existing repository of genetic diversity contained in the primary species populations. Finally, any Sonoran pronghorn lost

---

through reintroduction efforts would be replaced by the captive-breeding program at the Cabeza Prieta NWR pen. Sonoran pronghorn within the current U.S. range would continue to be listed as endangered under the ESA.

## 3.3 Wildlife, Including Special-Status Animal Species

### 3.3.1 Existing Conditions

Issues associated with wildlife that were identified during project scoping included potential effects on special-status species, mule deer, predator species, and effects of water developments. Therefore, the discussion in this section is focused on these areas.

Ninety-eight special-status animal species occur in the five counties containing the action area (Table 9). As used here, the term "special-status" refers to animal species having designation under the federal Endangered Species Act, species of concern identified by the Service or the Arizona Game and Fish Department, or species identified as sensitive by the BLM. Each of the 98 special-status species was evaluated to determine if it could potentially be affected by construction and operation of either a holding or captive-rearing pen at Area A or Area D or release of Sonoran pronghorn into the wild. This evaluation was accomplished by identifying those species with a distribution that included the proposed pen sites in areas A or D and that may occur in creosotebush-bursage or desert wash habitats. This evaluation resulted in identification of 11 species that may potentially be affected by either of the action alternatives. These 11 species are: banded Gila monster, Sonoran desert tortoise, Mexican rosy boa, Cactus Ferruginous Pygmy Owl, lesser long-nosed bat, Pale Townsend's big-eared bat, western

yellow bat, California leaf-nosed bat, cave myotis, pocketed free-tailed bat, and Sonoran pronghorn (Table 9). Pertinent aspects of the distribution and habitat association of these 11 species are summarized below.

**3.3.1.1 Banded Gila Monster** Banded Gila monster is a Service species of concern and a BLM sensitive species (Table 9). Banded Gila monster has been collected at Kofa NWR in Area A. The known distribution of banded Gila monster does not include Area D or the current U.S. range of Sonoran pronghorn. This species is most frequently found in rocky habitats in foothill, canyon, and bajada land forms up to about 5,000 ft elevation. Banded Gila monsters typically winter in rocky habitats on mountain slopes or outcrops and descend to bajada or valley floor habitats in the spring. The species is infrequently found in open plains habitats. The year-round home range is usually less than 0.6 miles. Banded Gila monster is active during the day from March to June and typically is found close to its burrow (Arizona Game and Fish Department, 2002a).

**Table 9.** Special-status animal species in the four counties encompassing the action area. Data sources for the table were the U.S. Fish and Wildlife Service (<http://www.fws.gov/southwest/es/arizona/Threatened.htm>, accessed 24 May 2009) and the Arizona Game and Fish Department ([http://www.azgfd.gov/w\\_c/edits/documents/ssspecies\\_bycounty.pdf](http://www.azgfd.gov/w_c/edits/documents/ssspecies_bycounty.pdf), accessed on 24 May 2009). Counties are coded as: **L** = La Paz; **M** = Maricopa; **Pa** = Pima; **Pn** = Pinal; and **Y** = Yuma. Status codes for Endangered Species Act or other Fish and Wildlife Service (**ESA/FWS STATUS**) designation are: **SC** = species of concern; **C** = candidate for listing under the ESA; **T** = listed as threatened under the ESA; **E** = listed as endangered under the ESA (**XN** = experimental and nonessential population); and **PD** = proposed for delisting. Wildlife of special concern in Arizona (**AZ STATUS**) is coded as **SC**. Bureau of Land Management status (**BLM STATUS**) is coded as **S** = sensitive. Those species that may occur at pen sites in Area A or Area D are highlighted.

SPECIES	COUNTIES	ESA/FWS STATUS	AZ STATUS	BLM STATUS
INVERTEBRATES (5 taxa)				
Squaw Peak Talussnail ( <i>Sonorella allynsmithi</i> )	M	SC	---	---
San Xavier Talussnail ( <i>Sonorella eremita</i> )	Pa	SC	---	---
Quitobaquito Tryonia ( <i>Tryonia quitobaquidae</i> )	Pa	SC	---	---
Sabino Canyon Damselfly ( <i>Argia sabino</i> )	Pa	SC	---	---
Maricopa Tiger Beetle ( <i>Cicindela oregona maricopa</i> )	M,Pn	SC	---	S
FISHES (16 taxa)				
Gila Longfin Dace ( <i>Agosia chrysogaster chrysogaster</i> )	M,Pa,Pn	SC	---	S
Bonytail Chub ( <i>Gila elegans</i> )	L,M	E	SC	---
Gila Chub ( <i>Gila intermedia</i> )	Pa,Pn	E	SC	---
Roundtail Chub ( <i>Gila robusta</i> )	M,Pa	SC	SC	---
Spikedace ( <i>Meda fulgida</i> )	Pn	T	SC	---
Woundfin ( <i>Plagopterus argentissimus</i> )	M	E	SC	---
Colorado Pikeminnow ( <i>Ptychocheilus lucius</i> )	M	E (XN)	SC	---
Speckled Dace ( <i>Rhinichthys osculus</i> )	M,Pn	SC	---	S
Loach Minnow ( <i>Tiaroga cobitis</i> )	Pn	T	SC	---
Desert Sucker ( <i>Catostomus clarki</i> )	M,Pa,Pn	SC	---	S
Sonora Sucker ( <i>Catostomus insignis</i> )	M,Pn	SC	---	S
Little Colorado Sucker ( <i>Catostomus</i> sp.)	M	SC	SC	---
Razorback Sucker ( <i>Xyrauchen texanus</i> )	L,M,Pn,Y	E	SC	---

Table 9, continued

SPECIES	COUNTIES	ESA/FWS STATUS	AZ STATUS	BLM STATUS
Quitobaquito Desert Pupfish ( <i>Cyprinodon eremus</i> )	Pa	E	SC	---
Desert Pupfish ( <i>Cyprinodon macularius</i> )	M,Pa,Pn	E	SC	---
Gila Topminnow ( <i>Poeciliopsis occidentalis occidentalis</i> )	M,Pa,Pn	E	SC	---
AMPHIBIANS (7 taxa)				
Arizona Toad ( <i>Bufo microscaphus</i> )	L,M	SC	---	---
Great Plains Narrow-mouthed Toad ( <i>Gastrophryne olivacea</i> )	M,Pa,Pn	---	SC	S
Western Barking Frog ( <i>Eleutherodactylus augusti cactorum</i> )	Pa	---	SC	---
Chiricahua Leopard Frog ( <i>Lithobates [Rana] chiricahuensis</i> )	Pa	T	SC	---
Lowland Leopard Frog ( <i>Lithobates [Rana] yavapaiensis</i> )	L,M,Pa,Pn	SC	SC	---
Lowland Burrowing Tree Frog ( <i>Pternohyala fodiens</i> )	M,Pa	---	SC	S
REPTILES (16 taxa)				
Giant Spotted Whiptail ( <i>Aspidoscelis burti stictogrammis</i> )	Pa,Pn	SC	---	S
Red-backed Whiptail ( <i>Aspidoscelis xanthonota</i> )	M,Pa,Pn	SC	---	---
Arizona Skink ( <i>Eumeces gilberti arizonensis</i> )	M	SC	SC	---
Texas Horned Lizard ( <i>Phrynosoma cornutum</i> )	Pa	SC	---	S
Flat-tailed Horned Lizard ( <i>Phrynosoma mcallii</i> )	Y	SC	SC	S
Banded Gila Monster ( <i>Heloderma suspectum cinctum</i> )	L,M,Y	SC	---	S
Chuckwalla ( <i>Sauromalus ater</i> )	M,Y	SC	---	S
Yuma Desert Fringe-toed Lizard ( <i>Uma rufopunctatus</i> )	Pa,Y	SC	SC	---
Mojave Fringe-toed Lizard ( <i>Uma scoparia</i> )	L	---	SC	---
Sonoran Desert Tortoise ( <i>Gopherus agassizii</i> )	L,M,Pa,Pn,Y	SC	SC	S
Sonoyta Mud Turtle ( <i>Kinosternon sonoriense longifemorale</i> )	Pa	C	---	---
Desert Rosy Boa ( <i>Charina trivirgata gracia</i> )	L,M,Y	SC	---	S
Mexican Rosy Boa ( <i>Charina trivirgata trivirgata</i> )	M,Pa	SC	---	S
Tucson Shovel-nosed Snake ( <i>Chionactis occipitalis klauberi</i> )	M,Pa,Pn	---	---	S
Brown Vinesnake ( <i>Oxybelis aeneus</i> )	Pa	---	SC	---
Northern Mexican Gartersnake ( <i>Thamnophis eques megalops</i> )	M,Pa,Pn	C	SC	---

Table 9, continued

SPECIES	COUNTIES	ESA/FWS STATUS	AZ STATUS	BLM STATUS
BIRDS (34 taxa)				
Clark's Grebe ( <i>Aechmophorus clarkii</i> )	L	---	SC	---
California Brown Pelican ( <i>Pelecanus occidentalis californicus</i> )	L,Y,Pn	PD	---	---
Least Bittern ( <i>Ixobrychus exilis</i> )	L,M,Pn,Y	---	SC	---
Great Egret ( <i>Ardea alba</i> )	L,M,Pn,Y	---	SC	---
Snowy Egret ( <i>Egretta thula</i> )	M,Y	---	SC	---
White-faced Ibis ( <i>Plegadis chihi</i> )	L	SC	---	---
Black-bellied Whistling-duck ( <i>Dendrocygna autumnalis</i> )	M,Pa,Pn	---	SC	---
Fulvous Whistling-duck ( <i>Dendrocygna bicolor</i> )	Pa	SC	---	---
Mississippi Kite ( <i>Ictinia mississippiensis</i> )	M,Pn	---	SC	---
Northern Goshawk ( <i>Accipiter gentilis</i> )	Pa	SC	SC	---
Northern Gray Hawk ( <i>Buteo nitidis maxima</i> )	Pa,Pn	SC	SC	---
Common Black-hawk ( <i>Buteogallus anthracinus anthracinus</i> )	M,Pa,Pn	---	SC	---
Osprey ( <i>Pandion haliaetus</i> )	M,Pa	---	SC	---
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	L,M,Pn,Y	T	SC	---
Crested Caracara ( <i>Caracara chariway</i> )	Pa	---	SC	S
American Peregrine Falcon ( <i>Falco peregrinus anatum</i> )	L,M,Pa,Pn,Y	SC	SC	S
Masked Bobwhite ( <i>Colinus virginianus ridgewayi</i> )	Pa	E	SC	---
Yuma Clapper Rail ( <i>Rallus longirostrus yumanensis</i> )	L,M,Pa,Pn,Y	E	SC	---
California Black Rail ( <i>Laterallus jamaicensis coturniculus</i> )	L,Y	---	SC	---
Western Snowy Plover ( <i>Charadrius alexandrinus nivosus</i> )	M	---	SC	---
Yellow-billed Cuckoo ( <i>Coccyzus americanus</i> )	L,M,Pa,Pn,Y	C	SC	---
Cactus Ferruginous Pygmy Owl ( <i>Glaucidium brasiliarum cactorum</i> )	Pa,Pn,Y	SC	SC	S
Mexican Spotted Owl ( <i>Strix occidentalis lucida</i> )	M,Pa,Pn	T	SC	---
Western Burrowing Owl ( <i>Athene cunicularia hypugaea</i> )	L,M,Pa,Pn,Y	SC	---	S
Elegant Trogon ( <i>Trogon elegans</i> )	Pa	---	SC	---
Belted Kingfisher ( <i>Megaceryle alcyon</i> )	M	---	SC	---
Rose-throated Becard ( <i>Pachyramphus aglaiae</i> )	Pa	---	SC	---

Table 9, continued

SPECIES	COUNTIES	ESA/FWS STATUS	AZ STATUS	BLM STATUS
Southwestern Willow Flycatcher ( <i>Empidonax traillii extimus</i> )	L,M,Pa,Pn,Y	E	SC	---
Northern Buff-breasted Flycatcher ( <i>Empidonax fulvifrons pygmaeus</i> )	Pa	SC	SC	---
Thick-billed Kingbird ( <i>Tyrannus crassirostris</i> )	Pa,Pn	---	SC	---
Tropical Kingbird ( <i>Tyrannus melancholicus</i> )	Pa,Pn	---	SC	---
Loggerhead Shrike ( <i>Lanius ludovicianus</i> )	L,M,Pa,Pn,Y	SC	---	---
Black-capped Gnatcatcher ( <i>Polioptila nigriceps</i> )	Pa	---	SC	---
Baird's Sparrow ( <i>Ammodrammus bairdii</i> )	Pa	SC	SC	---
MAMMALS (20 taxa)				
Mexican Long-tongued Bat ( <i>Choeronycteris mexicana</i> )	Pa,Pn	SC	SC	---
Pale Townsend's Big-eared Bat ( <i>Corynorhinus townsendii pallescens</i> )	L,M,Pa,Pn,Y	SC	---	S
Spotted Bat ( <i>Euderma maculatum</i> )	Y	SC	SC	S
Greater Western Bonneted Bat ( <i>Eumops perotis californicus</i> )	L,M,Pa,Pn,Y	SC	---	---
Underwood's Bonneted Bat ( <i>Eumops underwoodi</i> )	Pa	SC	---	S
Western Red Bat ( <i>Lasiurus blossevillei</i> )	L,M,Pa,Pn	---	SC	---
Western Yellow Bat ( <i>Lasiurus xanthinus</i> )	L,M,Pa,Pn,Y	---	SC	---
Lesser Long-nosed Bat ( <i>Leptonycteris curasoae yerbabuena</i> )	M,Pa,Pn,Y	E	SC	---
California Leaf-nosed Bat ( <i>Macrotus californicus</i> )	L,M,Pa,Pn,Y	SC	SC	S
Western Small-footed Bat ( <i>Myotis ciliolabrum</i> )	Pn	SC	---	---
Arizona Myotis ( <i>Myotis occultus</i> )	Pa	SC	---	S
Cave Myotis ( <i>Myotis velifer</i> )	L,M,Pa,Pn	SC	---	S
Yuma Myotis ( <i>Myotis yumanensis</i> )	L,M,Pn,Y	SC	---	---
Pocketed Free-tailed Bat ( <i>Nyctinomops femorosaccus</i> )	L,M,Pa,Pn,Y	---	---	S
Big Free-tailed Bat ( <i>Nyctinomops macrotis</i> )	Pa	SC	---	S
Yellow-nosed Cotton Rat ( <i>Sigmodon ochrognathus</i> )	Pa	SC	---	---
Yuma Hispid Cotton Rat ( <i>Sigmodon hispidus eremicus</i> )	Y	SC	---	---
Ocelot ( <i>Leopardis [Felis] pardalis</i> )	Pa	E	SC	---
Jaguar ( <i>Panthera onca</i> )	Pa	E	SC	---
Sonoran Pronghorn ( <i>Antilocapra americana sonoriensis</i> )	M,Pa,Y	E	SC	---

### 3.3.1.2 Sonoran Desert Tortoise

Sonoran desert tortoise is a Service and Arizona species of concern (Table 9). The distribution of Sonoran desert tortoise includes both areas A and D, as well as the current U.S. range of Sonoran pronghorn. Sonoran Desert tortoise is typically found on rocky slope and bajada habitats at elevations from about 500 to 5,300 ft. In the Sonoran Desert, it most commonly occurs in the paloverde-mixed cacti vegetation association. Adequate shelter is a primary habitat feature for desert tortoise, and shelters typically consist of shallow burrows in loose soil in locations such as under rocks or boulders and less often under vegetation. Caliche caves in desert washes and rock crevices may also be used. Peak activity is during the summer monsoon season when mating occurs (Arizona Game and Fish Department, 2001a).

3.3.1.3 Mexican Rosy Boa Mexican rosy boa is a Service species of concern and a BLM sensitive species (Table 9). The distribution of Mexican rosy boa may include portions of Area D and the current U.S. range of Sonoran pronghorn. Mexican rosy boa occurs at elevations ranging from about 1,460 to 2,800 ft. This snake was frequently found in relatively rock-free desert flats on Organ Pipe Cactus NM, where rodent burrows were commonly used as shelter. Mexican rosy boa is active at night and in the twilight hours of dusk and dawn. The species mates from May to June and live young are born in October and November (Arizona Game and Fish Department, 2001b).

### 3.3.1.4 Cactus Ferruginous Pygmy Owl

Cactus ferruginous pygmy owl is a Service and Arizona species of concern (Table 9). This species may occur in Area D and in the current U.S. range of Sonoran pronghorn. It is most commonly associated with riparian habitats dominated by cottonwood and willow and adjacent mesquite bosques, usually with saguaros

on nearby slopes. This owl is less commonly found in desert wash habitat with large mesquite, paloverde, ironwood, and saguaro. Cactus ferruginous pygmy owl nests in cavities in broadleaf riparian trees or saguaro cactus. Nests are typically located 10 to 20 feet above the ground and eggs are laid in late April. Young fledge 27 to 30 days after hatching (Arizona Game and Fish Department, 2001c).

### 3.3.1.5 Loggerhead Shrike

Loggerhead shrike is a Service species of concern (Table 9). This species occurs in both areas A and D and in the current U.S. range of Sonoran pronghorn as a year-round resident (Sibley, 2003: 295). This species, the only known predatory songbird in the U.S., is declining throughout its range in North America (Morrison, 1981; Cade and Woods, 1997; Arizona Department of Game and Fish, 2004g). Loss of breeding habitat is thought to be a primary cause of decline of this species (Cade and Woods, 1997). Loggerhead shrike typically occurs in landscapes with scattered shrubs (often spiny or thorny species) and low trees in a matrix of low vegetation such as short grasses and forbs and bare ground, such as some agricultural lands, grasslands desert scrub, and savannah (Cade and Woods, 1997). Fence lines and utility line poles are often used for impaling prey and as perch sites. Nests are typically located in clumps of taller vegetation such as trees or shrubs in habitats dominated by sparse, low vegetation (Boal *et al.*, 2003). Nests are typically located eight to 15 feet above the ground (Arizona Department of Game and Fish, 2004g). Four to seven eggs are laid and incubated for 14 to 16 days. Young are independent in about 36 days. There is typically two broods per season (Arizona Department of Game and Fish, 2004g). Loggerhead shrike feeds on insects, small birds, lizards and rodents (Arizona Department of Game and Fish, 2004g).

**3.3.1.6 Lesser Long-nosed Bat** Lesser long-nosed bat is listed as endangered under the ESA and is an Arizona species of concern (Table 9). Critical habitat is not designated for lesser long-nosed bat. The range of lesser long-nosed bat includes portions of the current U.S. range of Sonoran pronghorn and Area D. Lesser long-nosed bat occurs in Arizona from April through October; they migrate to Mexico for the winter months. Lesser long-nosed bat bear young in Arizona. Maternity colonies and roosts are located in old mines and caves. These bats are nectar feeders and they forage among saguaro, ocotillo, paloverde, and prickly pear. They are important pollinators of a variety of Sonoran Desert plant species (Arizona Game and Fish Department, 2003a).

**3.3.1.7 Pale Townsend's Big-eared Bat** Pale Townsend's big-eared bat is identified as a species of concern by the Service and is a BLM sensitive species (Table 9). This bat occurs throughout the action area. Its distribution includes the current U.S. range of Sonoran pronghorn, Area D, and Area A. Pale Townsend's big-eared bat occurs throughout Arizona. Young are born from late April through mid-July. Summer day roosts are located in caves or mines. Night roosts are often located in abandoned buildings. Winter hibernation is typically in cold caves, lava tubes, or mines. The species is most frequently found above about 3,000 ft elevation, although records of occurrence are from 550 to 7,520 ft elevation. This bat feeds primarily on small moths (Arizona Game and Fish Department, 2003b).

**3.3.1.8 Western Yellow Bat** Western yellow bat is identified as a species of concern by the Arizona Game and Fish Department (Table 9). In Arizona, western yellow bat is known primarily from Tucson and Phoenix, but has also been collected in Yuma and at Yuma Proving Ground. This bat has been collected from the vicinity of

the proposed pen site in Area A (L. Smythe, Kofa NWR, pers. comm., 22 July 2009). This bat appears to be a year-round resident in Arizona and is a solitary roosting species. It seems to be closely associated with Washington fan palm trees and broad-leaved deciduous riparian tree species. Dead leaf shirts of palm trees are an important roosting habitat for western yellow bat. Western yellow bat occurs from about 550 to 6,000 ft elevation (Arizona Game and Fish Department, 2003c).

**3.3.1.9 California Leaf-nosed Bat** California leaf-nosed bat is identified as a species of concern by both the Service and the Arizona Game and Fish Department (Table 9). This bat occurs throughout the action area. Its distribution includes the current U.S. range of Sonoran pronghorn, Area D, and Area A. California leaf-nosed bat is a year-round resident in Arizona. The species occurs in Sonoran desertscrub usually up to about 2,500 ft elevation. Maternity and day roosts are located in caves, mines, and rock shelters. Breeding occurs in the fall and young are born in May and June. California leaf-nosed bat forages primarily on insects (Arizona Game and Fish Department, 2001d).

**3.3.1.10 Cave Myotis** Cave myotis is a Service species of concern and a BLM sensitive species (Table 9). The distribution of this bat includes the current U.S. range of Sonoran pronghorn and Area D. Cave myotis may occur year-round in Arizona, although most individuals migrate south for the winter. Breeding occurs in late fall and into the winter. These bats enter hibernacula in late September or early October in Arizona. Young are born from May to early July. Maternity and colonial roost sites are located in caves, tunnels, mines, bridges, and sometimes buildings, typically within a few miles of water. Cave myotis occur in desertscrub habitats dominated by creosotebush, paloverde, cacti, and

brittlebush (Arizona Game and Fish Department, 2002b).

### **3.3.1.11 Pocketed Free-tailed Bat**

Pocketed free-tailed bat is identified as a sensitive species by the BLM (Table 9). This bat occurs throughout the action area. Its distribution includes the current U.S. range of Sonoran pronghorn, Area D, and Area A. This colonial bat species produce young in late June and early July. It roosts in rock crevices during the day. Pocketed free-tailed bat is typically associated with high cliffs and rock outcrops from about 190 to 7,520 ft elevation (Arizona Game and Fish Department, 2001e).

### **3.3.1.12 Sonoran Pronghorn**

Sonoran pronghorn is listed as endangered under the ESA and is identified as a species of concern by the Arizona Game and Fish Department (Table 9). Critical habitat is not designated for Sonoran pronghorn. Sonoran pronghorn does not occur in areas A or D; it is only found within the current U.S. range (*cf.* Figure 9). Information on the historic and current distribution, life history, and ecology of Sonoran pronghorn is provided in section 1.3.

### **3.3.1.13 Mule Deer**

Mule deer (*Odocoileus hemionus*) occur in areas A and D as well as the current range of Sonoran pronghorn (Hoffmeister, 1986: 540). However, mule deer and Sonoran pronghorn typically use different habitats, with the exception of winter when some overlap may occur. Mule deer are most commonly associated with dense vegetation in desert washes, riparian areas, and upland habitats. In Area D, mule deer density is low and the species is most common in northern portion of the area in the vicinity of the Gila River (Arizona Game and Fish Department, 2009c). Mule deer density is low in the eastern and southern portions of Area A. Higher densities of mule deer occur on Kofa NWR, particularly in

the desert mountain habitats (Arizona Game and Fish Department, 2009c).

### **3.3.1.14 Predator Species**

Mountain lion (*Puma concolor*), bobcat (*Felis rufus*), and coyote (*Canis latrans*) are the principal predators of Sonoran pronghorn. These three species occur throughout the action area.

## **3.3.2 Effects on Wildlife, Including Special-Status Animal Species**

### **3.3.2.1 Alternative I**

Alternative I would not have any impacts on special-status species or other wildlife, as no actions would be implemented that would change existing conditions.

### **3.3.2.2 Alternatives II and III**

Alternatives II and III could potentially affect wildlife by two pathways: 1) through physical disturbance caused by construction and operation of captive-breeding or holding pens in areas A or D; or 2) through release of Sonoran pronghorn into the wild.

### **Banded Gila Monster**

Banded Gila monster could potentially be affected by construction of a captive-breeding pen at Kofa NWR in Area A (Table 10). Release of Sonoran pronghorn into the wild would not affect this species. Construction of the captive-breeding pen in Area A would result in disturbance of about 15 acres of primarily creosotebush-bursage habitat.

**Table 10.** Summary of effects on special-status animal species from alternatives II and III.

SPECIES	AREA	ALTERNATIVE II	ALTERNATIVE III
Banded Gila Monster	A	Unlikely to affect individuals, is not likely to result in a trend toward federal listing or loss of viability	No effect on species
Sonoran Desert Tortoise	A,D	Unlikely to affect individuals, is not likely to result in a trend toward federal listing or loss of viability	Unlikely to affect individuals, is not likely to result in a trend toward federal listing or loss of viability
Mexican Rosy Boa	D	Unlikely to affect individuals, is not likely to result in a trend toward federal listing or loss of viability	Unlikely to affect individuals, is not likely to result in a trend toward federal listing or loss of viability
Cactus Ferruginous Pygmy Owl	D	No effect on species	No effect on species
Loggerhead Shrike	A,D	No effect on species	No effect on species
Lesser Long-nosed Bat	D	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect
Pale Townsend's Big-eared Bat	A,D	No effect on species	No effect on species
Western Yellow Bat	A	No effect on species	No effect on species
California Leaf-nosed Bat	A,D	No effect on species	No effect on species
Cave Myotis	D	No effect on species	No effect on species
Pocketed Free-tailed Bat		No effect on species	No effect on species
Sonoran Pronghorn	A,D	May affect, but is not likely to adversely affect	May affect, but is not likely to adversely affect

The probability of occurrence of banded Gila monster at the pen site is low because the species is absent from or only infrequently found in creosotebush flats and the area of potential ground disturbance is small. The pen site would be surveyed for this species prior to construction. If banded Gila monster is found at the proposed pen site, appropriate mitigation measures would be implemented to avoid or reduce impacts. These measures could include minor adjustments in location of the pen or modifying internal pen features to avoid impacts. Alternative III would have no effect on the species. Alternative II would be unlikely to affect individuals and would not be likely to result in a trend toward federal listing or a loss of viability of banded Gila monster.

**Sonoran Desert Tortoise** Sonoran desert tortoise could potentially be affected by construction of a captive-breeding pen at Kofa NWR in Area A or construction of a pen on BMGR-East in Area D (Table 10). Release of Sonoran pronghorn into the wild would not affect this species. Construction of the captive-breeding pen in Area A would result in disturbance of about 15 acres of primarily creosotebush-bursage habitat. Construction of a captive-breeding in Area D would result in disturbance of up to about 15 acres of creosotebush-bursage habitat, while the holding pen construction would only impact about five acres. The probability of occurrence of Sonoran desert tortoise at either of these pen sites is low because of the small area affected and shallow soils that are only marginally suitable for excavation of shelter burrows required by the species. The pen sites would be surveyed for Sonoran desert tortoise prior to construction. If Sonoran desert tortoise is found at either of the proposed pen sites, appropriate mitigation measures would be implemented to avoid or reduce impacts. These measures could include minor adjustments in location of the pen, translocating animals that may be moving through

the area (using the Arizona Game and Fish Department desert tortoise handling protocol), or modifying internal pen features to avoid impacts. Alternatives II or III are unlikely to affect individuals and would not be likely to result in a trend toward federal listing or a loss of viability of Sonoran desert tortoise.

**Mexican Rosy Boa** Mexican rosy boa could potentially be affected by construction of a captive-breeding or holding pen on BMGR-East in Area D (Table 10). Release of Sonoran pronghorn into the wild would not affect this species. Construction of the holding pen in Area D would result in disturbance of up to about 15 acres of creosotebush-bursage habitat. The probability of occurrence of Mexican rosy boa at the holding pen site is low due to the small area that would be subject to ground disturbance. The pen sites would be surveyed for Mexican rosy boa prior to construction. If the species is found at the proposed holding pen site, appropriate mitigation measures would be implemented to avoid or reduce impacts. These measures could include minor adjustments in location of the pen or modifying internal pen features to avoid impacts. Alternatives II or III are unlikely to affect individuals and would not be likely to result in a trend toward federal listing or a loss of viability of Mexican rosy boa.

**Cactus Ferruginous Pygmy Owl** Cactus ferruginous pygmy owl would not be affected by construction of a pen on BMGR-East in Area D (Table 10), because there would be no disturbance of any potential nesting habitat for this species (*i.e.* saguaro cacti or riparian vegetation). The proposed pen site perimeter(s) would be surveyed for nesting birds prior to construction and any nests sites found would be avoided. Release of Sonoran pronghorn into the wild would also not affect this species. Therefore, alternatives II or III would not affect cactus ferruginous pygmy owl.

**Loggerhead Shrike** Loggerhead shrike would not be affected by construction of a pen at either BMGR-East in Area D or on Kofa NWR in Area A (Table 10), because there would be no disturbance of any potential nesting habitat for this species (*e.g.* trees, large shrubs). The proposed pen site perimeter(s) would be surveyed for nesting birds prior to construction and any nests sites found would be avoided. Release of Sonoran pronghorn into the wild would also not affect this species. Therefore, alternatives II or III would not affect loggerhead shrike.

**Lesser Long-nosed Bat** Lesser long-nosed bat may potentially be affected by construction of a holding or captive-breeding pen on BMGR-East in Area D (Table 10). Release of Sonoran pronghorn into the wild would not affect this species. Construction of the holding pen would not impact any known or potential roost sites, but it would disturb a small amount of potential foraging habitat for the species. However, the magnitude of this disturbance (*ca.* 15 acres maximum) would not materially affect the overall quantity and quality of potential foraging habitat for the species in the vicinity of the holding pen site. Water developments for Sonoran pronghorn may enhance habitat by providing a source of drinking water (*cf.* Rabe and Rosenstock, 2005). Alternatives II or III may affect, but would not be likely to adversely affect lesser long-nosed bat.

**Pale Townsend's Big-eared Bat, Western Yellow Bat, California Leaf-nosed Bat, Cave Myotis, and Pocketed Free-tailed Bat** None of these bat species would be affected by construction of pens on Kofa NWR in Area A or BMGR-East in Area D (Table 10). Release of Sonoran pronghorn into the wild would not affect any of these species. Construction of the captive-breeding and holding pens would not impact any known or potential roost sites. Similarly, disturbance of a maximum of about 20 acres of creosotebush-bursage vegetation (15 acres at the

Area A pen site and five acres at the Area D pen site) would have an immeasurable effect on insect prey taken by these bat species, while water developments may enhance habitat by providing a source of drinking water. However, the water developments would have a small surface area, which would limit their use by bat species (Rabe and Rosenstock, 2005). Therefore, alternatives II or III would not affect Pale Townsend's big-eared bat, western yellow bat, California leaf-nosed bat cave myotis, or pocketed free-tailed bat.

**Sonoran Pronghorn** The effects on conservation status of Sonoran pronghorn from alternatives II and III are discussed in detail in section 3.2. Alternatives II or III may affect, but would not be likely to adversely affect Sonoran pronghorn.

**Other Wildlife, Including Mule Deer and Predator Species** Alternatives II and III include water developments for Sonoran pronghorn. Up to five waters may be development in non-wilderness areas outside of the pen sites at either location (*i.e.* Area A and/or Area D). Water developments for Sonoran pronghorn may be used by other wildlife species in addition to Sonoran pronghorn. Rosenstock and others (2004) recorded use of water developments by 29 vertebrate species in a study that included Yuma Proving Ground, Kofa NWR, and adjacent BLM lands. However, proposed water developments are unlikely to change community composition or abundance of wildlife species. For example, Burkett and Thompson (1994) found no effect of water developments on native wildlife species richness or population size across a broad taxonomic spectrum in habitats ranging from Chihuahuan desert scrub to piñon-juniper woodland. Proposed water developments are unlikely to increase the abundance or distribution of vectors of hemorrhagic diseases or of water-borne pathogens (*e.g.* trichomoniasis; Rosenstock *et al.*, 2004). Similarly, the proposed waters would not present an entrapment and drowning

risk for wildlife (Andrew *et al.*, 2001; Rosenstock *et al.*, 2004) as their design includes shallow water depths and escape ramps for small animals.

Proposed water developments associated with alternatives II and III are unlikely to result in an increase in predation on either Sonoran pronghorn or other game species such as mule deer. In a study conducted in southern Arizona, it was found that predator species were attracted to wildlife water developments to drink rather than to hunt (DeStefano *et al.*, 2000). DeStefano and others (2000) concluded that water developments may actually serve to disperse the predator population compared to a situation with no or few water developments. There are no data or studies to support a conclusion that the proposed water developments would increase predation rates on large mammal species such as Sonoran pronghorn or mule deer (*cf.* Rosenstock *et al.*, 1999; Krausman *et al.*, 2006).

Neither alternative II or III includes predator control outside of the proposed pens. If a mountain lion, bobcat, or coyote were to get into either a captive-breeding pen or holding pen, they would be removed immediately. Based on five years of operation of the captive-breeding pen at Cabeza Prieta NWR, predator entry into a pen is likely to be a very rare event. There are no plans to conduct any predator control outside of the pens. Therefore, alternatives II and III would be unlikely to have any measurable effect on the abundance of coyotes, bobcats, or mountain lions in areas A or D.

Construction of perimeter fencing at pen site(s) could potentially affect nests of migratory birds if nests are located along the proposed fence alignments. In order to avoid or minimize this potential impact, proposed pen site perimeters would be surveyed for nesting birds prior to construction. Nest sites located along proposed

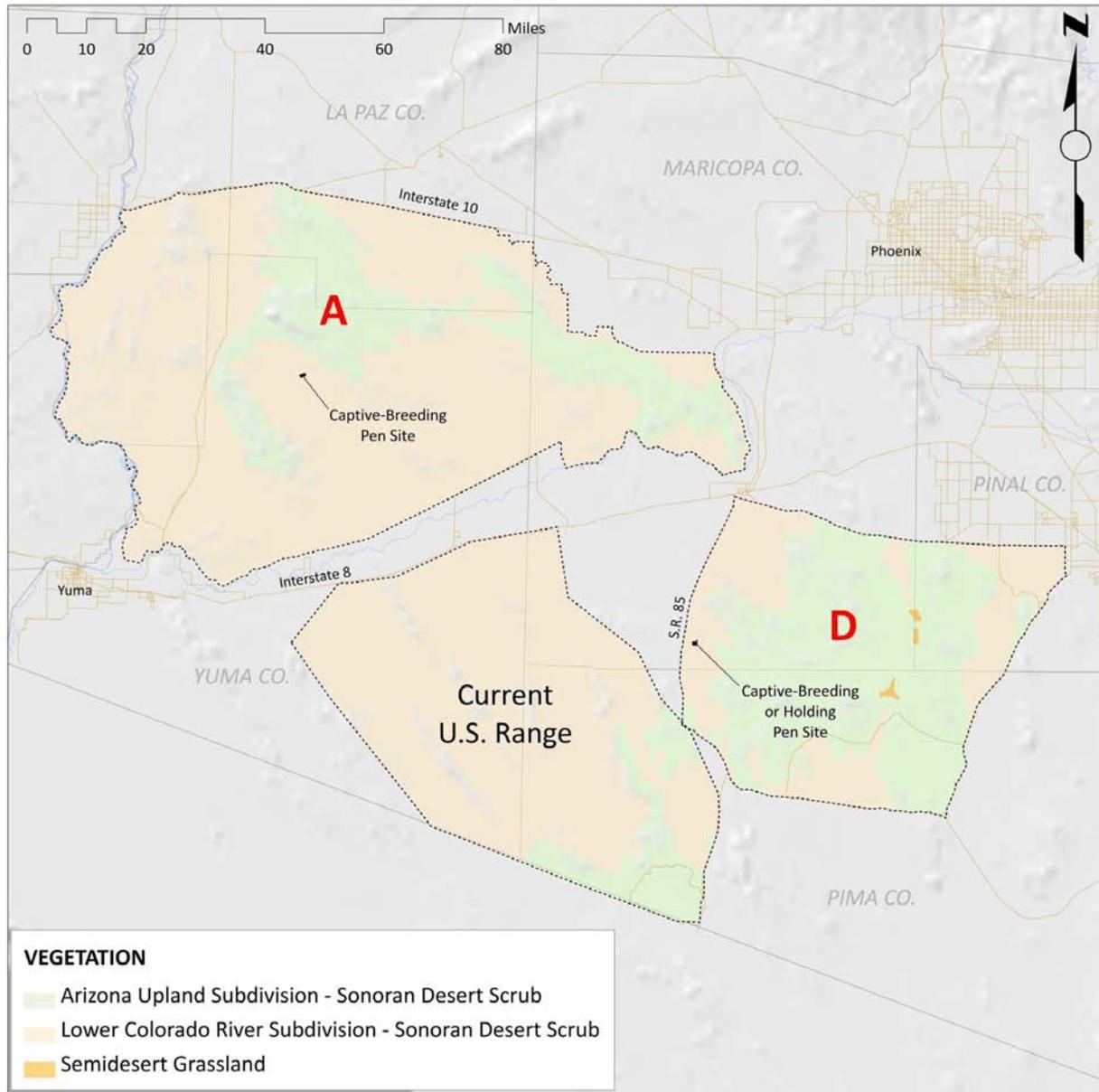
fence alignments would be avoided or would be taken only with a migratory bird permit from the U.S. Fish and Wildlife Service, Region 2, Migratory Bird Permit Office (505-248-7882). In any event, any active nests of raptor species found along the proposed fence alignments would be avoided by adjusting the fence location.

## 3.4 Vegetation, Including Special-Status Plant Species

### 3.4.1 Existing Conditions

Issues associated with vegetation that were identified during project scoping included potential effects on special-status species and noxious weeds. Therefore, the discussion in this section is focused on these areas. Vegetation in the action area consists primarily of Sonoran desertscrub, with some small patches of semidesert grassland in Area D (Figure 16). Two subdivisions of the Sonoran desertscrub biome are present in the action area: Lower Colorado River Valley and Arizona Upland (Turner and Brown, 1994).

**Figure 16.** Vegetation in the action area.



The Lower Colorado River Valley subdivision is the most common vegetation in the action area, composing about 80 percent of the vegetation in Area A, 35 percent of the vegetation in Area D, and 88 percent of the vegetation in the current U.S. range of Sonoran pronghorn (Figure 16). The creosotebush-bursage series (Turner and Brown, 1994: 193) is the most characteristic plant community of the Lower Colorado River Valley subdivision vegetation in the action area. Both of the proposed pen site locations are located in the Lower Colorado River Valley subdivision vegetation (Figure 16).

The Arizona Upland subdivision composes about 20 percent of the vegetation in Area A, 65 percent of the vegetation in Area D, and 12 percent of the vegetation in the current U.S. range of Sonoran pronghorn (Figure 16). This vegetation is typified by the paloverde-cacti-mixed scrub series, which is dominated by paloverde, columnar cacti such as the saguaro, and ironwood (Turner and Brown, 1994: 201). Semidesert grassland makes up about 0.4 percent of the vegetation in Area D.

Seventy-nine special-status plant species occur in the five counties containing the action area (Table 11). As used here, the term "special-status" refers to plant species having designation under the federal Endangered Species Act, species of concern identified by the Service, species identified as sensitive by the BLM, or species having designation under the Arizona Native Plant Law of 2006. Each of the 79 special-status species was evaluated to determine if it could potentially be affected by construction and operation of either a holding or captive-rearing pen at Area A or Area D. This evaluation was accomplished by identifying those species with a distribution that included the proposed pen sites in areas A or D and that may occur in creosotebush-bursage or desert wash habitats. This evaluation resulted in identification of eight species that may potentially be affected by either of the action

alternatives. These eight species are: golden cholla, staghorn cholla, Acuña cactus, California barrel cactus, Engelmann cholla (variety *flavispina*), desert night-blooming cereus, organ pipe cactus, and Tumamoc globeberry (Table 11). Pertinent aspects of the distribution and habitat association of these eight species are summarized below.

**3.4.1.1 Golden Cholla** Golden cholla, also commonly known as silver cholla, occurs in Area A. Its distribution includes the current U.S. range of Sonoran pronghorn but does not include Area D. Golden cholla is found from about 160 to 5,600 ft elevation in the Mojave and Sonoran deserts on sandy, loam, alluvial, or gravelly substrates. Golden cholla flowers in the spring, from March to June (Flora of North America Editorial Committee, 2003: 116). This cactus is listed as 'salvage restricted' under the Arizona Native Plant Law and may be collected only with a permit from the Arizona Department of Agriculture.

**3.4.1.2 Staghorn Cholla** Staghorn cholla may potentially occur in Area D and the current U.S. range of Sonoran pronghorn. Its distribution does not appear to include Area A.

This cholla cactus is found from about 1,970 to 4,265 ft elevation in the Sonoran Desert in desert scrub vegetation on flats, in desert washes, and on rocky hillsides and in canyons. It flowers in the spring, from April to June (Flora of North America Editorial Committee, 2003: 109). This cactus is listed as 'salvage restricted' under the Arizona Native Plant Law and may be collected only with a permit from the Arizona Department of Agriculture.

**Table 11.** Special-status plant species in the four counties encompassing the action area. Data sources for the table were the U.S. Fish and Wildlife Service (<http://www.fws.gov/southwest/es/arizona/Threatened.htm>, accessed 24 May 2009) and the Arizona Game and Fish Department ([http://www.azgfd.gov/w\\_c/edits/documents/ssspecies\\_bycounty.pdf](http://www.azgfd.gov/w_c/edits/documents/ssspecies_bycounty.pdf), accessed on 24 May 2009). Counties are coded as: **L** = La Paz; **M** = Maricopa; **Pa** = Pima; **Pn** = Pinal; and **Y** = Yuma. Status codes for Endangered Species Act or other Fish and Wildlife Service (**ESA/FWS STATUS**) designation are: **SC** = species of concern; **C** = candidate for listing under the ESA; and **E** = listed as endangered under the ESA. Status for designation under the Arizona Plant Law of 2006 (**AZ STATUS**) is coded as: **HS** = highly safeguarded, no collection allowed; and **SR** = salvage restricted, collection only with a permit. Bureau of Land Management status (**BLM STATUS**) is coded as **S** = sensitive.

SPECIES	COUNTIES	ESA/FWS STATUS	AZ STATUS	BLM STATUS
Pima Indian Mallow ( <i>Abutilon parishii</i> )	M,Pa,Pn	SC	SR	S
Thurber Indian Mallow ( <i>Abutilon thurberi</i> )	Pa	---	SR	---
Arizona Agave ( <i>Agave arizonica</i> )	M	---	HS	---
Tonto Basin Agave ( <i>Agave delamateri</i> )	M	SC	HS	---
Hohokam Agave ( <i>Agave murpheyi</i> )	M,Pn	SC	HS	S
Santa Cruz Striped Agave ( <i>Agave parviflora parviflora</i> )	Pa	SC	HS	---
Toumey Agave ( <i>Agave toumeyana</i> v. <i>bella</i> )	M,Pn	---	SR	---
Trelease Agave ( <i>Agave schottii</i> v. <i>treleasei</i> )	Pa	SC	HS	---
Bigelow Onion ( <i>Allium bigelovii</i> )	M	---	SR	---
Goodding's Onion ( <i>Allium gooddingii</i> )	Pa	SC	HS	---
Parish Onion ( <i>Allium parishii</i> )	Y	---	SR	S
Plummer Onion ( <i>Allium plummerae</i> )	Pa	---	SR	---
Saiya ( <i>Amoreuxia gonzalezii</i> )	Pa	SC	HS	---
Large-flowered Blue Star ( <i>Amsonia grandiflora</i> )	Pa	SC	---	---
Kearney's Blue Star ( <i>Amsonia kearneyana</i> )	Pa	E	HS	---
Dalhouse Spleenwort ( <i>Asplenium dalhousiae</i> )	Pa	---	---	S
Kofa Barberry ( <i>Berberis harrisoniana</i> )	M,Pa,Y	---	---	S
Arizona Giant Sedge ( <i>Carex ultra</i> )	Pa,Pn	---	---	S
Pima pineapple cactus ( <i>Coryphantha scheeri</i> v. <i>robustispina</i> )	Pa	E	HS	---
Gander's Cryptantha ( <i>Cryptantha ganderi</i> )	Y	SC	---	---
Golden Cholla ( <i>Cylindropuntia echinocarpa</i> )	L,M,Y	---	SR	---

Table 11, continued

SPECIES	COUNTIES	ESA/FWS STATUS	AZ STATUS	BLM STATUS
Staghorn Cholla ( <i>Cylindropuntia versicolor</i> )	Pa,Pn	---	SR	---
Gentry Indigo Bush ( <i>Dalea tentaculoides</i> )	Pa	SC	HS	S
Nichol Turk's Head Cactus ( <i>Echinocactus horizonthalonius</i> v. <i>nicholii</i> )	Pa,Pn	E	HS	---
Clustered Barrel Cactus ( <i>Echinocactus polycephalus</i> v. <i>polycephalus</i> )	Y	---	SR	---
Magenta-flower Hedgehog-cactus ( <i>Echinocereus fasciculatus</i> )	Pa	---	SR	---
Arizona Hedgehog ( <i>Echinocereus triglochidiatus</i> v. <i>arizonicus</i> )	Pn	E	HS	---
Acuña Cactus ( <i>Echinomastus erectocentrus</i> v. <i>acuñensis</i> )	M,Pa,Pn	C	HS	---
Needle-spined Pineapple Cactus ( <i>Echinomastus erectocentrus</i> v. <i>erectocentrus</i> )	Pa,Pn	SC	SR	---
Mogollon Fleabane ( <i>Erigeron anchana</i> )	Pn	SC	---	---
Fish Creek Fleabane ( <i>Erigeron piscaticus</i> )	M	SC	SR	S
San Carlos Wild Buckwheat ( <i>Eriogonum capillare</i> )	Pa,Pn	SC	SR	---
Ripley Wild Buckwheat ( <i>Eriogonum ripleyi</i> )	M	SC	SR	---
San Pedro River Wild Buckwheat ( <i>Eriogonum terranatum</i> )	Pa	---	---	S
Dune Spurge ( <i>Euphorbia platysperma</i> )	Y	SC	---	---
California Barrel Cactus ( <i>Ferocactus cylindraceus</i> v. <i>cylindraceus</i> )	M,Y	---	SR	---
Golden Barrel Cactus ( <i>Ferocactus cylindraceus</i> v. <i>eastwoodiae</i> )	M,Pa,Pn	---	SR	---
Emory's Barrel-cactus ( <i>Ferocactus emoryi</i> )	M	---	SR	---
Flannel Bush ( <i>Fremontodendron californicum</i> )	M,Pn	---	SR	S
Bartram Stonecrop ( <i>Graptopetalum bartramii</i> )	Pa	SC	SR	S
Dune Sunflower ( <i>Helianthus niveus tephrodes</i> )	Y	SC	---	---
Huachuca Golden Aster ( <i>Heterotheca rutteri</i> )	Pa	SC	---	S
Chisos Coral-root ( <i>Hexalectris revoluta</i> )	Pa	---	SR	S
Crested Coral-root ( <i>Hexalectris spicata</i> )	Pa	---	SR	---
Pringle Hawkweed ( <i>Hieracium pringlei</i> )	Pa	SC	---	---
Huachuca Water Umbel ( <i>Lilaeopsis schaffneriana recurva</i> )	Pa,Pn	E	HS	---
Lemon Lily ( <i>Lilium parryi</i> )	Pa	SC	SR	---
Broadleaf Twayblade ( <i>Listera convallarioides</i> )	Pa	---	SR	---
Littleleaf False Tamarind ( <i>Lysiloma watsonii</i> )	Pa	---	SR	---

Table 11, continued

SPECIES	COUNTIES	ESA/FWS STATUS	AZ STATUS	BLM STATUS
Slender Adders Mouth ( <i>Malaxis tenuis</i> )	Pa	---	SR	---
Counter Clockwise Fishhook Cactus ( <i>Mammalaria mainiae</i> )	Pa	---	SR	---
Thornber Fishhook Cactus ( <i>Mammalaria thornberi</i> )	Pa,Pn	---	SR	---
Varied Fishhook Cactus ( <i>Mammalaria viridiflora</i> )	L,Pa,Pn	---	SR	---
Wiggins Milkweed Vine ( <i>Metastelma mexicanum</i> )	Pa	SC	---	---
Lemmon Cloak Fern ( <i>Notholaena lemmonii</i> )	Pa	SC	---	---
Cholla ( <i>Opuntia engelmannii</i> v. <i>flavispina</i> )	M,Pa	---	SR	---
Kelvin Cholla ( <i>Opuntia x kelvinensis</i> )	Pa	---	SR	---
Senita Cactus ( <i>Pachycereus schottii</i> )	Pa,Y	---	SR	---
Beardless Chinch Weed ( <i>Pectis imberbis</i> )	Pa	SC	---	---
Desert Night-blooming Cereus ( <i>Peniocereus greggii</i> v. <i>transmontanus</i> )	Pa	---	SR	---
Dahlia Rooted Cereus ( <i>Peniocereus striatus</i> )	Pa	---	SR	---
Catalina Beardtongue ( <i>Penstemon discolor</i> )	Pa,Pn	---	HS	---
Ajo Rock Daisy ( <i>Perityle ajoensis</i> )	Pa	---	SR	---
Fish Creek Rock Daisy ( <i>Perityle saxicola</i> )	M	SC	---	---
Scaly Sandplant ( <i>Pholisma arenarium</i> )	L	---	HS	S
Sand Food ( <i>Pholisma sonorae</i> )	Y	SC	HS	S
Thurber's Bog Orchid ( <i>Platanthera limosa</i> )	Pa	---	SR	---
Whisk Fern ( <i>Psilotum nudum</i> )	Pa	---	HS	---
Arizona Cliffrose ( <i>Purshia subintegra</i> )	M	E	HS	---
Kearney Sumac ( <i>Rhus kearneyi</i> )	Y	---	SR	S
Aravaipa Sage ( <i>Salvia amissa</i> )	Pn	SC	---	S
Fallen Ladies'-tresses ( <i>Schiedeella arizonica</i> )	Pa	---	SR	---
Organ Pipe Cactus ( <i>Stenocereusthurberi</i> )	M,Pa,Pn	---	SR	---
Schott Wire Lettuce ( <i>Stephanomeria schottii</i> )	Y	---	---	S
Aravaipa Wood Fern ( <i>Thelypteris puberula</i> v. <i>sonorensis</i> )	Pa,Pn	---	---	S
Blue Sand Lily ( <i>Triteleopsispalmeri</i> )	Pa,Y	---	SR	S
Tumamoc Globeberry ( <i>Tumamoca macdougalii</i> )	M,Pa,Pn	---	SR	S

Table 11, continued

SPECIES	COUNTIES	ESA/FWS STATUS	AZ STATUS	BLM STATUS
Arizona Sonoran Rosewood ( <i>Vauquelinia californica sonorensis</i> )	M,Pa	---	---	S
California Fan Palm ( <i>Washingtonia filifera</i> )	Y	---	SR	---

**3.4.1.3 Acuña Cactus** Acuña cactus is a candidate for listing under the ESA and is listed as 'highly safeguarded' under the Arizona Native Plant Law, meaning that no collection of the species is allowed. Acuña cactus may occur in Area D and within the current U.S. range of Sonoran pronghorn. It is not known to occur in Area A. It has a restricted range, occurring in the Arizona Upland Subdivision of the Sonoran Desert on granitic soils of well-drained knolls and gravel ridges between large desert washes. It is found from about 1,310 to 2,625 ft elevation (Arizona Department of Game and Fish, 2004e; Flora of North America Editorial Committee, 2003: 195).

**3.4.1.4 California Barrel Cactus** California barrel cactus may potentially occur in Area A. Its distribution does not appear to include the current U.S. range of Sonoran pronghorn or Area D. California barrel cactus most often occurs on gravelly or rocky hillsides, but can also occur on canyon walls, alluvial fans, and wash margins. It is found on igneous and limestone substrates from sea level to about 4,925 ft elevation. This cactus usually flowers from early spring to early summer, but may also flower in late summer to early fall (Arizona Game and Fish Department, 2005d; Flora of North America Editorial Committee, 2003: 245). California barrel cactus is listed as 'salvage restricted' under the Arizona Native Plant Law and may be collected only with a permit from the Arizona Department of Agriculture.

**3.4.1.5 Engelmann Cholla var. *flavispinia*** This cholla cactus may potentially occur throughout the action area. It flowers in the spring (April through May) and occurs on sandy bajadas from about 1,640 to 2,625 ft elevation (Flora of North America Editorial Committee, 2003: 136). This cactus is listed as 'salvage restricted' under the Arizona Native Plant Law and may be collected only with a permit from the Arizona Department of Agriculture.

**3.4.1.6 Desert Night-blooming Cereus** Desert night-blooming cereus occurs in Areas A and D and the current U.S. range of Sonoran pronghorn. This cactus has been well-documented on Kofa NWR (L. Smythe, Kofa NWR, pers. comm.). Desert night-blooming cereus is found in creosotebush-bursage flats, the edges of washes, and on the slopes of small hills from about 985 to 3,610 ft elevation. This cactus is commonly associated with creosotebush and is found in sandy or gravelly loams. It flowers in spring and summer, with the flowers lasting only one night (Flora of North America Editorial Committee, 2003: 156; Kearney and Peebles, 1960: 568). Desert night-blooming cereus is listed as 'salvage restricted' under the Arizona Native Plant Law and may be collected only with a permit from the Arizona Department of Agriculture.

**3.4.1.7 Organ Pipe Cactus** Organ pipe cactus occurs in Area D and the current U.S. range of Sonoran pronghorn. Its known distribution does not include Area A. Organ pipe cactus is a common columnar cactus of the Sonoran Desert, where it occurs in desert scrub habitat from about 65 to 3,600 ft elevation (Flora of North America Editorial Committee, 2003: 187). Organ pipe cactus is listed as 'salvage restricted' under the Arizona Native Plant Law and may be collected only with a permit from the Arizona Department of Agriculture.

**3.4.1.8 Tumamoc Globeberry** Tumamoc globeberry may occur in Area D and the current U.S. range of Sonoran pronghorn. Its known distribution does not appear to include Area A. This trailing-stemmed plant grows in the shade of nurse plants along desert washes in Sonoran desert scrub vegetation, where it may grow in tangled masses in bushes (Arizona Game and Fish Department, 2004f; Kearney and Peebles, 1960: 82). This plant is listed as 'salvage restricted' under the Arizona Native Plant Law and may be collected only with a permit from the Arizona Department of Agriculture. It is also listed as sensitive by the BLM.

**3.4.1.9 Noxious or Invasive Plants** Scoping identified two invasive plant species of potential concern in the action area: Sahara mustard (*Brassica tournefortii*) and buffel grass (*Pennisetum ciliare*). Buffel grass does not occur at either of the two proposed pen sites, but does occur in the larger vicinity in disturbed locations such as roadsides. Sahara mustard does occur in the vicinity of the proposed pen site in Area A. Specifically, it is found along the King Valley Road (L. Smythe, Kofa NWR, pers. comm.).

## 3.4.2 Effects on Vegetation, Including Special-Status Plant Species

**3.4.2.1 Alternative I** Alternative I would not have any impacts on vegetation, including special-status plant species or invasive plants, as no actions would be implemented that would change existing conditions.

**3.3.2.2 Alternative II** Alternative II would affect vegetation through physical disturbance caused by construction and operation of the captive-breeding pen in Area A and the holding pen in Area D. Construction of the captive-breeding pen in Area A would result in disturbance of about 15 acres of primarily creosotebush-bursage habitat. Construction of the holding pen in Area D would result in disturbance of about another five acres of creosotebush-bursage habitat.

Construction of the holding pen in Area D has the potential to impact six of the eight special-status plant species that may occur in the action area (Table 12).

The potential for finding these relatively rare plants within the five-acre disturbance area at the holding pen site is low. However, the site would be surveyed prior to construction to determine if any of the species are present. All of these species may be collected or translocated with a permit from the Arizona Department of Agriculture except one, which is the Acuña cactus. If any of the special-status plant species are found, impacts will be minimized by translocating individuals or, in the case of Acuña cactus, making minor adjustments in the pen location to avoid impacts.

**Table 12.** Summary of effects on special-status plant species from alternatives II and III.

SPECIES	AREA(S) OF POTENTIAL OCCURRENCE	ALTERNATIVE II	ALTERNATIVE III
Golden Cholla	A	May affect individuals, permit required for removal and translocation	No effect on species
Staghorn Cholla	A,D	May affect individuals, permit required for removal and translocation	May affect individuals, is not likely to result in a trend toward federal listing or loss of viability
Acuña Cactus	D	May affect individuals, no collection is allowed	May affect individuals, no collection is allowed
California Barrel Cactus	A	May affect individuals, permit required for removal and translocation	No effect on species
Englemann Cholla (variety <i>flavispina</i> )	A,D	May affect individuals, permit required for removal and translocation	May affect individuals, permit required for removal and translocation
Desert Night-blooming Cereus	A, D	May affect individuals, permit required for removal and translocation	May affect individuals, permit required for removal and translocation
Organ Pipe Cactus	D	May affect individuals, permit required for removal and translocation	May affect individuals, permit required for removal and translocation
Tumamoc Globeberry	D	May affect individuals, permit required for removal and translocation	May affect individuals, permit required for removal and translocation

Construction of the captive-breeding pen at Area A has the potential to impact four of the eight special-status plant species that may occur in the action area (Table 12). As with the holding pen, the potential for finding any of these four species in the 20-acre impact area is low. The pen site would be surveyed prior to construction and if any of the four special-status plant species are found, the individuals would be translocated after

obtaining a permit from the Arizona Department of Agriculture.

Disturbance of up to about 20 acres of creosotebush-bursage vegetation for construction of the pens may provide an opportunity for buffel grass or Sahara mustard to become established. The potential for colonization of disturbed ground by Sahara mustard at the pen site in Area A is fairly high, due to the close proximity of

populations of the species to the pen site. Potential for weed colonization of disturbed ground would be minimized by ensuring that all construction equipment is steam-cleaned prior to being brought on site. Also, disturbed areas would be monitored regularly, in conjunction with normal operation of the pen facilities, to detect the presence of either of these weed species. If either are detected, appropriate measures would be taken to remove the plants. Buffel grass can be controlled by application of herbicide during periods of active growth or by mechanical removal of the entire plant. Hand-pulling of Sahara mustard, which is an annual, is an effective control measure for small infestations, as is herbicide application early in the life cycle of the plant.

**3.3.2.3 Alternative III** Alternative III would affect vegetation through physical disturbance caused by construction and operation of a captive-breeding pen in Area D. Construction of the captive-breeding pen in Area D would result in disturbance of about 15 acres of primarily creosotebush-bursage habitat. This would have the potential to impact six of the eight special-status plant species that may occur in the action area (Table 12). As described above under effects of Alternative II, the potential for finding any of these species in the 15-acre disturbance area is low. The pen site would be surveyed prior to construction to determine if any of the special-status plant species are present. If any of the special-status plant species are found, impacts will be minimized by translocating individuals, in the case of Acuña cactus, making minor adjustments in the pen location to avoid impacts. If plants are to be moved, a permit from the Arizona Department of Agriculture would first be obtained.

Disturbance of about 15 acres of creosotebush-bursage vegetation for construction of the captive-breeding pen in Area D could provide an

opportunity for establishment of buffel grass or Sahara mustard. This potential effect would be minimized by ensuring that all construction equipment is steam-cleaned prior to being brought on site. Disturbed areas would be monitored regularly, in conjunction with normal operation of the pen, to detect the presence of either of these weed species. If either are detected, appropriate measures will be taken to remove the plants as described above under Alternative II.

## 3.5 Water

### 3.5.1 Existing Conditions

Issues associated with water that were identified during project scoping included potential effects on groundwater levels and the water quality of surface-water developments for Sonoran pronghorn.

Developed wildlife waters and natural water sources within Area A are primarily located in habitats that would not be used by Sonoran pronghorn or used only infrequently. For example, there are no developed wildlife waters in potential Sonoran pronghorn habitat in the King Valley. Within Area D, there are numerous developed wildlife waters in paloverde-mixed cacti-mixed scrub vegetation on bajadas, which could potentially be used by Sonoran pronghorn (U.S. Air Force, 2008: 3-10).

An existing well located north of the proposed pen site on Kofa NWR (registration number 800183) was completed at a depth of 1,070 ft and has a capacity of 18 gallons per minute (L. Smythe, Service, pers. comm., 20 May 2009). There is no known contamination of groundwater at this site. Depth to groundwater in the vicinity of the proposed pen site on BMGR-East in Area D is likely 200 to 700 feet below the ground surface (U.S. Air Force, 2008: 3-13; Arizona Department

of Water Resources, 2009). Groundwater quality in the vicinity of the proposed pen site on BMGR-East in Area D is characterized by high total dissolved solids, boron, and fluoride (U.S. Air Force, 2008: 3-13; Arizona Department of Water Resources, 2009). There are no known cases of groundwater contamination on BMGR-East (U.S. Air Force, 2008: 3-14). Both of the pen sites are located in the Wellton-Mohawk sub-basin of the Lower Gila River watershed. There are no existing groundwater wells in the vicinity of the proposed pen sites in areas A or D, other than the well north of the pen site on Kofa NWR in Area A.

## 3.5.2 Effects on Water

**3.5.2.1 Alternative I** Alternative I would not have any impacts on water resources as no actions would be implemented that would change existing conditions.

**3.5.2.2 Alternative II** Alternative II would include groundwater use at the captive-breeding pen site in Area A for two waters and irrigation of up to 12 forage enhancement plots. The two waters inside the pen would require about 0.02 acre-feet per year (*i.e.* 6,200 gallons per year), assuming an annual evaporation rate of about 8.33 ft and an exposed surface area of no more than 50 square feet per water. Irrigation of 12 forage plots would require about another 14.75 acre-feet per year, assuming that about 0.33 ft of water per acre per year is applied and each forage plot is about 3.7 acres. Thus, the average annual groundwater requirement for the captive-breeding pen at Area A would be about 14.8 acre-feet or 4.8 million gallons. This requirement is well within the capacity of the existing well (*i.e.* 25,920 gallons/day or 9.5 million gallons per year).

Development of five additional wildlife waters outside of the pen in potential Sonoran pronghorn habitat would utilize capture of surface water

runoff or would be supplied with hauled water. These five waters would require about 0.05 acre-feet per year, or about 15,600 gallons per year. This estimate is based on a surface area of no more than 50 ft<sup>2</sup> per water and an average evaporation rate of 8.33 ft. Alternative II would also include a water within the holding pen at Area D. Water would be hauled to the pen. Using the same surface area and evaporation rate described above, about 0.01 acre-feet per year, or 3,117 gallons, would be required.

In summary, Alternative II would result in use of up to about 4.83 million gallons of water per year for the two pen sites and wildlife waters developed outside of the proposed pen in Area A. There are no existing groundwater wells in the vicinity of either of the pen sites that could potentially be affected by the alternative.

**3.5.2.3 Alternative III** Alternative III would include groundwater use at the captive-breeding pen site in Area D for two waters and irrigation of up to 12 forage enhancement plots. Water requirements would be the same as that described for the captive-breeding pen at Kofa NWR in Alternative II, which is conservatively estimated to be about 14.8 acre-feet or 4.8 million gallons per year. Alternative III does not include any water developments outside of the captive-breeding pen in Area D. There are no existing groundwater wells in the vicinity of the pen site on BMGR-East in Area D that could potentially be affected by the alternative.

## 3.6 Air Quality

### 3.6.1 Existing Conditions

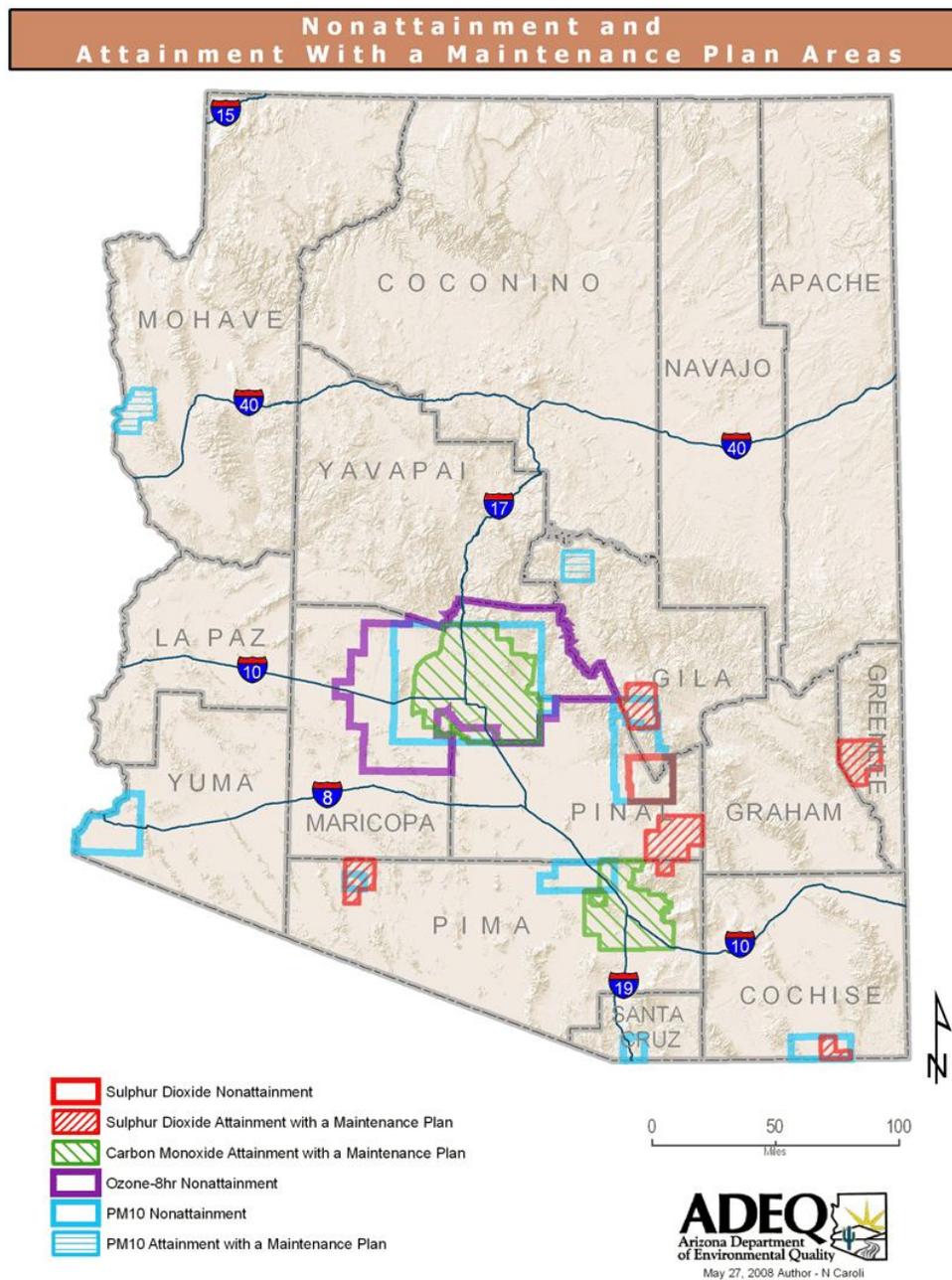
The Clean Air Act of 1970, as amended, established National Ambient Air Quality Standards for six criteria air pollutants: ozone, airborne particulates (PM<sub>10</sub> and PM<sub>2.5</sub>), carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. If measured concentrations of the six pollutants exceed their respective standards, the U.S. Environmental Protection Agency (U.S. EPA) can designate an area as nonattainment area for that pollutant.

The Air Quality Division of the Arizona Department of Environmental Quality (ADEQ) is responsible for enforcement of the Clean Air Act standards within Arizona. In addition, three Arizona counties (Maricopa, Pima, and Pinal) have their own air pollution control programs that operate pursuant to agreements with ADEQ. Of the five counties that include portions of either Area A or Area D or both areas, four counties (all but La Paz) have at least one geographical area of nonattainment or area of attainment with a maintenance plan for one of the six criteria pollutants (Arizona Department of Environmental Quality, 2009; Table 13; Figure 17).

**Table 13.** Air quality attainment status for locales in counties comprising areas A and D. Attainment status is shown with respect to criteria air pollutants. Source of data is Arizona Department of Environmental Quality (2009).

LOCATION CRITERIA AIR POLLUTANT	MARICOPA COUNTY	PIMA COUNTY			PINAL COUNTY		YUMA COUNTY
	Phoenix Area	Ajo Area	Rillito Area	Tucson Area	Hayden Area	San Manuel Area	Yuma Area
PM <sub>10</sub> nonattainment area	X	X	X		X		X
Ozone nonattainment area	X						
Sulfur dioxide nonattainment area					X		
Sulfur dioxide attainment area with maintenance plan		X				X	
Carbon monoxide attainment area with maintenance plan	X			X			

**Figure 17.** Attainment status areas in Arizona for six criteria air pollutants (Arizona Department of Environmental Quality, 2009).



Effects on visibility are another consideration with projects that have the potential to contribute emissions of air pollutants that, in turn, may contribute to regional haze. Regional haze is defined as visibility impairment caused by the emission of air pollutants from numerous sources located over a wide geographic area. Air pollutants contributing to regional haze may be from natural sources (*e.g.* windblown dust or soot from wildfires) or manmade sources (*e.g.* engine combustion from equipment or vehicle operation, burning of fossil fuels for energy production or manufacturing).

In 1977, the Clean Air Act was amended to designate Mandatory Federal Class I areas where visibility was determined to be an important value. There are 156 national parks and wilderness areas identified as Class I areas (40 CFR Part 81, Subpart D, §§81.401 through 81.437) that are protected under the regional haze program administered by the U.S. EPA. Twelve Class I areas are in Arizona, but none are within Area A or Area D.

In Maricopa County, airborne particulates or "fugitive dust" from unstable or disturbed dirt surfaces (such as construction areas, vacant lots, dirt roads and dirt tracked out onto paved surfaces) are the largest manmade contributors to the County's non-attainment of the PM<sub>10</sub> standard (Maricopa County, 2009). A dust control permit is required for all project sites that would disturb more than 0.1 acres of soil. The permit requires development and implementation of a dust control plan.

### 3.6.2 Effects on Air Quality

**3.6.2.1 Alternative I** The no action alternative would not affect existing air quality or regional haze as no changes would occur in regards to reestablishment of additional Sonoran pronghorn populations.

**3.6.2.2 Alternative II** The proposed project would result in short-term effects to local air quality from equipment operation during construction. A temporary increase in fugitive dust would be expected as a result of captive-breeding pen fence construction (which would be buried one foot below ground), hauling sand and gravel, mixing concrete, and vehicle and equipment traffic over unpaved surfaces for construction of the captive-breeding pen.

Stocking the pen with Sonoran pronghorn from Cabeza Prieta NWR would require about 11 helicopter landings at Kofa NWR within a two-month period. Each helicopter landing and take-off would create a dust cloud, temporarily elevating the levels of PM<sub>10</sub> and carbon monoxide emissions in the vicinity of each of the pens. Continued access to the Kofa NWR captive-breeding pen over unpaved surfaces throughout the operational life of the pen (about 10 years) would also result in disturbance to soils that would create additional dust.

Best management practices would be employed during construction to reduce the amount of fugitive dust released into the air. These practices would include wetting of soils with water or a soil binder and conducting soil-disturbing activities when wind speeds are calm or low. The captive-breeding pen would be located in Yuma County but is not within the area of nonattainment for PM<sub>10</sub> (Figure 2 and Figure 16). No additional special measures or permits would be required by Yuma County.

Construction and operation of the holding pen at BMGR-East would be expected to result in fugitive dust as described for the captive-breeding pen, but to a lesser extent due to much less ground disturbance to build the pen and less frequent use of the holding pen. The holding pen would be less than one-tenth the size of the captive-breeding pen (20 acres versus 320 acres), have fewer

related facilities, and be used for only brief periods of time needed (maximum of 10 consecutive weeks per year if needed at all). As the holding pen would be constructed in Maricopa County and would entail more than 0.1 acres of ground disturbance, a dust control permit would be obtained from the County before construction. A dust control plan, as required by the permit, would be developed and implemented.

Local concentrations of carbon monoxide would increase from equipment and vehicle emissions during the construction period for both the captive-breeding and holding pens; some additional emissions would continue throughout the operation of the pens from vehicles accessing the site. Effects to air quality from vehicle and equipment emissions would be minimized by having emission control devices on all equipment. Due to the relatively remote project alternative locations and the limited spatial and temporal extent of increased carbon monoxide and particulate emissions, effects to air quality are not anticipated to contribute to existing or future nonattainment status of air quality described in section 3.6.1 for any of the five counties in areas A or D.

The consequences of release of Sonoran pronghorn into the wild, whether from a captive-breeding pen in Area A or holding pen in Area D, and the resulting establishment of one or more additional herds of pronghorn would have a negligible effect on air quality. Monitoring released pronghorn would entail new overflights every two months over Area A and over Area D if the holding pen is used to release Cabeza Prieta NWR captive-bred Sonoran pronghorn, which would contribute to emissions of carbon monoxide.

**3.6.2.3 Alternative III** Effects on air quality as described for a captive-breeding pen in Alternative II would be similar to that for for Alternative III. As the captive-breeding pen and holding pen would be combined into one facility at BMGR-East in Maricopa County, a dust control permit would be necessary for construction of the 320-acre pen size. As described for Alternative II, a dust control plan would be developed and implemented in accordance with Maricopa County ordinances.

As described for Alternative II, local concentrations of carbon monoxide would increase from equipment and vehicle emissions during the construction period for combined pen; some additional emissions would continue throughout the operation of the pen from vehicles accessing the site. Effects to air quality from vehicle and equipment emissions would be minimized by having emission control devices on all equipment.

Bi-monthly overflights for monitoring released pronghorn under this alternative would only be necessary in Area D, as all reestablishment activities would take place in this area. This alternative would have fewer flights and a slightly lower level of carbon monoxide emissions as compared to Alternative II.

---

## 3.7 Noise Levels

In analyzing effects of the proposed project on noise levels, the primary focus is any potential change in noise levels from the existing condition in the vicinity of the alternative captive-breeding pen and holding pen sites. When considering potential effects of increased noise levels, sensitive noise receptors are identified in a project area. Sensitive receptors include but are not limited to homes, lodging facilities, hospitals, parks, and undeveloped natural areas.

### 3.7.1 Existing Conditions

**3.7.1.1 Area A** The proposed captive-breeding pen location at Kofa NWR has a low level of noise as it is undeveloped land accessed by an unpaved road and surrounded by Kofa Wilderness or other undeveloped Refuge lands. Sources of noise in the vicinity of the proposed site for a captive-rearing pen are natural (*e.g.* wind causing vegetation movement, birds) or man-made. Man-made sounds are primarily engine noises from vehicles on Refuge roads (usually several each day during the busier winter months) or occasional airplane or helicopter overflights. Airplane flights are generally high enough (above 7,000 ft) that they result in little noise in the area (L.Smythe, Service, pers. comm., 8 May 2009). Helicopter and airplane flights, conducted at lower altitudes, create a disruption to the otherwise tranquil setting.

The Arizona Game and Fish Department conducts low-level airplane or helicopter flights over the Refuge for the purpose of surveying mule deer and bighorn sheep. Sheep surveys are conducted in the mountainous areas of Kofa NWR for about six consecutive days in October using two helicopters. Mule deer are surveyed for two-and-one-half days in January using a fixed-wing airplane for two days and a helicopter for one day.

The fixed wing portion of the survey covers the entire King Valley at low elevation (usually around 100 feet) but would be modified to avoid overflying the pen site. Arizona Department of Game and Fish also fly over the mountainous areas of the Refuge in the summer to conduct checks on wildlife water sources (L. Smythe, Kofa NWR, pers. comm., July 2009).

Sounds of explosions in the Castle Dome Mountains along the western boundary of Kofa NWR are a result of weapons-testing activities at Yuma Proving Ground. These explosions are not heard in the vicinity of the proposed pen facilities but further south in Area A (L.Smythe, Kofa NWR Biologist, pers. comm., 8 May 2009).

Across the rest of Area A, there are few developments. U.S. Highway 95 cuts a north-south line in the western portion of Area A. Within Area A, traffic volumes on this highway are highest at the southern end of the route where it is closest to the city of Yuma and Yuma Proving Ground administrative sites. In 2007, an average of more than 5,000 vehicles traveled daily along U.S. 95 to the main entrance to Yuma Proving Ground. Traffic volumes decreased markedly further north from the Yuma Proving Ground entrance to less than half that number of vehicles passing the main entrance to Kofa NWR (King Valley Road).

**3.7.1.2 Area D** Natural sounds in Area D are similar to those in Area A - wind rustling the vegetation, singing birds, and buzzing insects. Human-caused sources of noise in Area D are mostly related to engine noises from frequent military aircraft overflights or ground-based vehicles. The proposed pen site in Area D is located about 1.5 to 2.0 miles east of S.R. 85, the main route between Gila Bend, Arizona on Interstate 8 and points south, including BMGR-East, Organ Pipe Cactus NM, the Tohono O'odham Reservation, Cabeza Prieta NWR, and

Mexico. The 53-mile segment of S.R. 85 between Interstate 8 on the north and S.R. 86 on the south forms the western boundary of Area D. Average daily traffic volumes on this segment of S.R. 85 ranged from 1,800 to 5,500 vehicles in 2007, with the highest volume counted in Ajo and the lowest volume found along the 38-mile stretch between Gila Bend Auxiliary Field to the northern edge of Ajo.

Vehicles in closest proximity to the proposed BMGR-East pen site travel on the 'North-South Road' - an unpaved BMGR-East road about one mile east of S.R. 85 which parallels abandoned railroad tracks and is within a mile or less of the pen site. Vehicles currently using this road include BMGR-East staff, BMGR-East contract security officers, and recreationists with an access permit (A. Alvidrez, Luke AFB, pers. comm., 15 May 2009). Sounds of vehicle engines traveling on either the highway or 'North-South Road' may be heard in the pen vicinity depending on atmospheric conditions (*e.g.* wind direction) and the number and size of the vehicles.

The Hat Mountain area, where a pen site is proposed, is located between the BMGR-East Manned Ranges 1 and 2, which are located west of S.R. 85, and the East Tactical Range, which is east of the Saucedo Mountains. The Manned Range and East Tactical Range are areas of military activity at BMGR-East that involve military overflights and practice bombing runs. The flight patterns for some weapons delivery tactics at Range 2 pass nearby or sometimes overhead at the proposed pen site. The East Tactical Range is the closest area with live munition drops. On any given day, depending on the military activities being undertaken, the Hat Mountain area skies may have many overflights or they may be relatively quiet (A. Alvidrez, Luke AFB, 15 May 2009).

## 3.7.2 Effects on Noise Levels

**3.7.2.1 Alternative I** Alternative I (no action) would not result in any changes to existing noise levels as no activities would be undertaken to reestablish Sonoran pronghorn in either Area A or Area D. Existing sources of noise (*e.g.* vehicles, airplanes, explosions from military activities) would be expected to continue at current levels.

**3.7.2.2 Alternative II** Construction and operation of a captive-breeding pen would increase existing noise levels in the vicinity of the pen at Kofa NWR. Building the pen, anticipated to last up to three months, would entail use of a portable cement mixer, truck-mounted auger, water truck, and light vehicles. Stocking the pen with Sonoran pronghorn would result in approximately 11 helicopter flights into and out of Kofa NWR over two months in the winter of 2010-2011. Continued operation of the pen for up to 10 years would include daily vehicle and human presence in the area, including periods of high activity when replacing animals (*e.g.* rotating the breeding male) and during capture of young adults and releasing them into the adjacent wild areas.

The need for and potential frequency of use of a holding pen at BMGR-East for relocation of pronghorn from Cabeza Prieta NWR is very speculative for the 10-year planning period. If circumstances become such that constructing and utilizing a holding pen at BMGR-East for releasing adult pronghorn from the Cabeza Prieta pen into the wild in Area D, effects of these activities on noise levels are anticipated to be limited to no more than 10 consecutive weeks a year. Effects on surrounding noise levels over the 10-year analysis period would be small due to the short duration and intermittent nature of these activities.

Finally, release of adult pronghorn into the wild and reestablishment of one or more additional populations in Area A and/or Area D would result in occasional increases in existing noise levels due to bi-monthly overflights at a low altitude for monitoring the released animals. Implementation of this alternative would not change the frequency, intensity, or locations of military overflights as no changes in flight activities are associated with this action.

**3.7.2.3 Alternative III** Potential effects on existing noise levels from implementation of this alternative - building and operating a captive-rearing pen at BMGR-East and also using this pen for a temporary holding site for relocation of pronghorn from Cabeza Prieta NWR - would be similar to that described for constructing a captive-breeding pen for Alternative II. With this alternative, all activities would be undertaken at BMGR-East (*i.e.* no additional holding pen constructed), so most effects would be concentrated at BMGR-East with only the additional airplane flights for monitoring pronghorn taking place over other portions of Area D. Implementation of this alternative would not change the frequency, intensity, or locations of military overflights as no changes in flight activities are associated with this action.

## 3.8 Socioeconomic Conditions and Environmental Justice

Regulations for implementing NEPA require analysis of social effects when they are interrelated with effects on the physical or natural environment (40 CFR §1508.14). Federal agencies are also required to "identify and address disproportionately high and adverse human health or environmental effects" of their programs and actions on minority populations and low-income populations, as directed by Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations).

### 3.8.1 Existing Conditions

**3.8.1.1 Counties** Areas A and D each include parts of three counties. Area A consists of approximately 4,791 square miles (mi<sup>2</sup>) in La Paz, Yuma, and Maricopa counties (Table 14). One-half of Area A is located in Yuma County (Table 14). This portion of Area A constitutes about 37 percent of Yuma County and includes the location of the facilities proposed for construction (*i.e.* breeding pen, wildlife waters, forage plots). Another 35 percent of Area A is in La Paz County, and the remaining 15 percent of Area A is in Maricopa County.

Area D encompasses about 2,379 m<sup>2</sup>. About 80 percent of Area D is split between Maricopa (39 percent) and Pima (42 percent) counties (Table 14). The remaining portion of Area D (19 percent) is in Pinal County. All proposed facilities would be constructed in Maricopa County. About 10 percent of Maricopa County is in Area D.

**Table 14.** Counties in alternative Sonoran pronghorn reintroduction areas A and D.

ATTRIBUTE	LA PAZ	YUMA	MARICOPA	PIMA	PINAL	TOTAL
Total County Land Area (mi <sup>2</sup> )	4,514	5,519	9,225	9,180	5,374	--
County Land in Area A (mi <sup>2</sup> )	1,678	2,414	699	--	--	4,791
Percent of County in Area A	37%	44%	8%	--	--	--
Percent of Area A in County	35%	50%	15%	--	--	100
County Area in Area D (mi <sup>2</sup> )	--	--	926	1,005	449	2,379
Percent of County in Area D	--	--	10%	11%	8%	--
Percent of Area D in County	--	--	39%	42%	19%	100

Proposed locations for either a captive-breeding pen or a holding pen for reestablishing populations of Sonoran pronghorn are undeveloped lands. The larger areas across which new populations of Sonoran pronghorn might be established (*i.e.* the entire extent of potential habitat in areas A or D) include some scattered developments such as paved and dirt roads, military targets, fences, and buildings, but they are for the most part undeveloped.

Table 15 shows the populations of the State of Arizona, the combined population for the counties encompassing Area A (*i.e.* La Paz, Yuma, and Maricopa), and the combined population for the counties encompassing Area B (*i.e.* Maricopa, Pima, and Pinal) as reported in the 2000 U.S. Census (U.S. Census 2009a). July 2007 population estimates show an average population increase of almost 25 percent for Arizona and the combined county areas since 2000 (Table 15).

**3.8.1.2 Communities** There are no communities in vicinity of the proposed captive-breeding pen at Kofa NWR, since the site is in near the middle of a 665,400-acre national wildlife refuge. Area A has no developed residential areas within its boundaries; the closest

communities are located along Interstate 10 and Interstate 8, which form the northern and southern boundaries of Area A, respectively, and S.R.85 which bounds the southeastern portion of Area A. The largest cities and towns located along or near the Area A boundary are Quartzsite (population 3,354) in La Paz County, Gila Bend (population 1,980) in Maricopa County, and Yuma (population 77,515) in Yuma County (U.S. Census Bureau, 2009b).

There are no incorporated communities within the boundary of Area D although some small settlements and individual residences are located on Tohono O'odham Nation reservation lands within Area D. Larger communities are located along or near roads that serve as the area boundaries - Interstate 8, S.R. 85, S.R. 86, and BIA Road 15. The largest of these communities are Ajo (population 3,705) and Santa Rosa (population 438), which are both in Pima County, and Casa Grande (population 25,225) in Pinal County (U.S. Census Bureau, 2009b).

**Table 15.** Population of the counties comprising areas A and D. The table shows the populations of the State of Arizona and the combined Arizona counties that include Area A and Area D based on Census 2000 data. Populations estimates for 2007 are shown for the State of Arizona and the counties that include Areas A and D (U.S. Census Bureau, 2009a).

LOCATION	2000 POPULATION	2007 POPULATION ESTIMATE	PERCENT INCREASE
State of Arizona	5,130,632	6,338,755	23.5%
Area A Counties (La Paz, Maricopa, Yuma )	3,251,890	4,090,910	25.8%
Area D Counties (Maricopa, Pinal, Pima)	4,095,622	5,146,516	25.7%

### 3.8.1.3 Racial and Ethnic Demographics

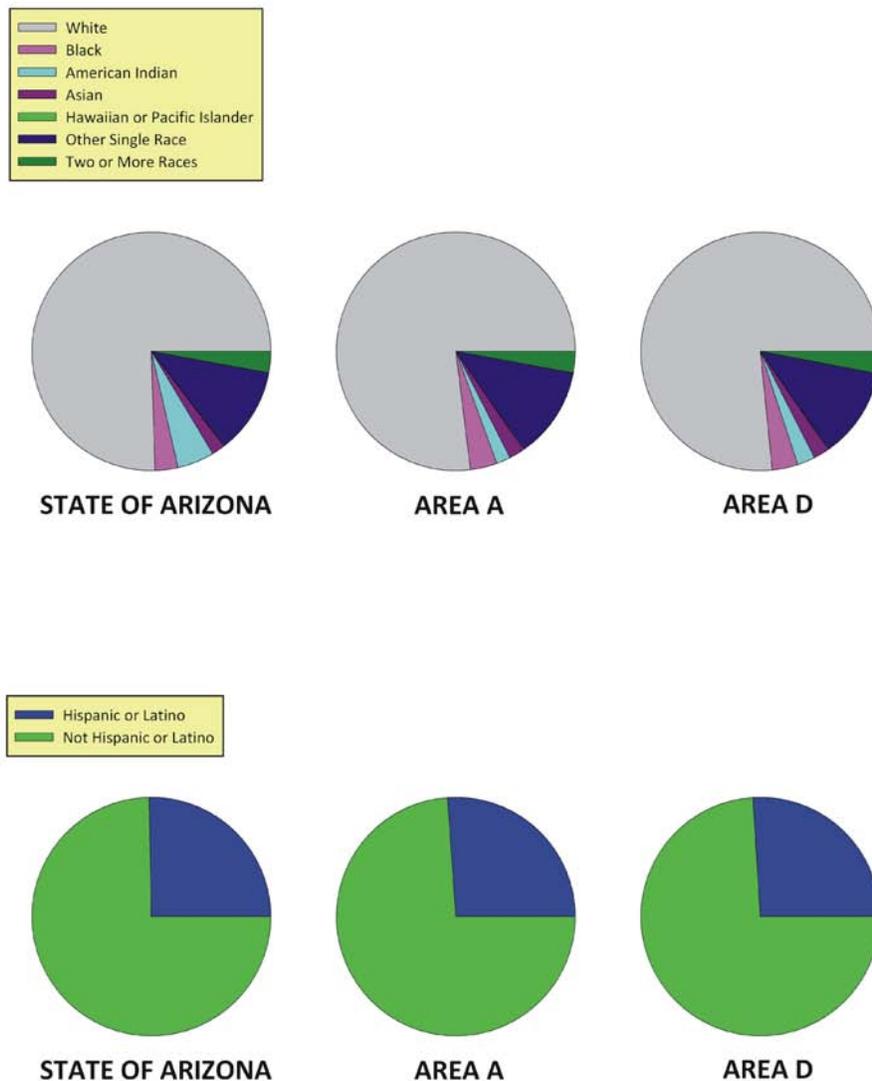
Racial and ethnic characteristics of the population of the State of Arizona (U.S. Census Bureau, 2009c), the combined counties of Area A (U.S. Census Bureau, 2009d), and the combined counties of Area D (U.S. Census Bureau, 2009d), based on the 2000 U.S. Census, are displayed in Figure 18.

Racially, the population of Arizona in 2000 was nearly identical to that of the three combined counties that comprise Area A and the three counties that comprise Area D in that roughly three-quarters of each population identified themselves as white (Figure 18). About 12 percent of each of the three population groups considered themselves “some other race” while about three percent characterize themselves as black or African American and another three percent consider themselves to be of “two or more races.” The only discernable difference in racial composition among the three groups was for American Indians or Alaska Natives. Across Arizona, about five percent of the populace placed themselves in this group, while in Area A and Area D, this racial group constituted only

about two percent of the population of each of those areas (Figure 18).

More than 25 percent of the total population of Arizona identified themselves Hispanic or Latino (U.S. Census Bureau, 2008c), which, again, was nearly the same as Area A and Area D in which 26 percent of both groups were identified as Hispanic or Latino (U.S. Census Bureau, 2009d; Figure 18).

**Figure 18.** Race and ethnicity characteristics of the analysis areas. The top three pie charts show percentage of the total population by race in Arizona and in the combined counties in Area A and Area D. The percentage of the population that is Hispanic or Latino is shown in the lower three pie charts. Source: (U.S. Census Bureau, 2009c; U.S. Census Bureau, 2009d).



**3.8.1.4 Economy** The population of the three counties comprising portions of Area A had an average per capita income of \$17,323 in 1999 (U.S. Census Bureau, 2009e). This income was about 90 percent of the average per capita income (\$19,354) a decade ago for the three counties that comprise Area D (Table 16).

Both Area A and Area D had lower per capita incomes than the average person in Arizona, which was estimated to be \$20,275 in 1999 (U.S. Census Bureau, 2009c). However, across Arizona, a slightly higher percentage of persons were living below poverty level (13.9 percent) in 2000 than were persons in the three counties that include Area A or the three counties that include Area D, which were 12.2 percent and 11.9 percent, respectively (U.S. Census Bureau, 2009c; U.S. Census Bureau, 2009f; Table 16).

**Table 16.** Economic characteristics of alternative Sonoran pronghorn reintroduction areas. The table compares per capita income (1999) and percentage of individuals living below poverty level for the two potential reintroduction areas and the State of Arizona (U.S. Census Bureau, 2009c, U.S. Census Bureau, 2009e, U.S. Census Bureau, 2008f).

Area	Per Capita Income	Percent of Population Living Below Poverty Level
State of Arizona	\$20,275	13.9%
Area A Counties	\$17,323	12.2%
Area D Counties	\$19,354	11.9%

## 3.8.2 Effects on Socioeconomic Conditions and Environmental Justice

**3.8.2.1 Alternative I** The No Action alternative would not have any effect on socioeconomic conditions in the local area or region as no changes would occur from the existing condition. No minority or low-income populations would be affected.

### 3.8.2.2 Alternatives II and III

**Environmental Justice** Proposed activities to reestablish Sonoran pronghorn within their

historic U.S. range (*e.g.* construction and operation of captive-breeding and holding pens and release of pronghorn into the wild) would not affect community services nor community cohesion as no communities exist in the proposed reestablishment areas A and D. Within communities surrounding areas A and D, no residences or businesses would be displaced and community resources such as schools, fire protection, law enforcement, and medical services would not change as a result of reestablishment of populations of Sonoran pronghorn. As no measurable detrimental effects from reestablishment of populations of Sonoran pronghorn are anticipated in regards to communities or individuals (*e.g.* loss of homes, businesses, or jobs; disruption of community

services or community cohesion), there would be no disproportionate adverse effects on low-income or minority populations. The proposed action is in compliance with E.O. 12898.

**Jobs** Implementation of either Alternative II or III would result in creation of two full-time technical staff jobs that would cost the Arizona Game and Fish Department about \$55,000 year, including benefits, for nine years. These jobs would be located in Yuma (Alternative II) or Ajo (Alternative III).

**Cost of Implementation** Cost of implementation would include benefits to local vendors, construction contractors, and other services in Yuma, Gila Bend, and Ajo for Alternative II and Gila Bend and Ajo for Alternative III.

Major costs of implementing Alternative II (not accounting for inflation) over the 10-year operation period are estimated as \$2.24 million and would be similar, but slightly less (\$1.98 million), for Alternative III (Table 17). The lower cost for Alternative III would be primarily due to savings in transportation costs for initial stocking of the captive-breeding pen, daily pronghorn monitoring operations, and vehicle replacement costs. The double-duty use of the captive-breeding pen at BMGR-East as a holding pen for release of Sonoran pronghorn from the Cabeza Prieta NWR captive-breeding pen is an additional cost savings.

**Table 17.** Estimated costs of alternatives II and III over the 10-year analysis period. Cost estimates were developed by team members during interdisciplinary team meetings.

ITEM	ALTERNATIVE II	ALTERNATIVE III
Construction of Captive Breeding Pen	\$200,000	\$200,000
Construction of a Holding Pen	\$25,000	\$0
Drill Well and Construct Water System	\$165,000	\$165,000
Construct Seven Wildlife Waters	\$140,000	\$140,000
Generator for Well Pump	\$20,000	\$20,000
Helicopter to Transport Pronghorn to Captive-breeding Pen	\$20,000	\$6,000
Pronghorn Monitor Salaries	\$1,000,000	\$1,000,000
Vehicle Purchases	\$100,000	\$70,000
Vehicle Operation	\$250,000	\$50,000
Supplemental Pronghorn Feed	\$55,000	\$55,000
Monitoring Released Pronghorn (Overflights)	\$270,000	\$270,000
<b>TOTAL</b>	<b>\$2,240,00</b>	<b>\$1,976,000</b>

Costs not included in the implementation estimates are:

- salaries of staff already employed by Service, Arizona Game and Fish Department, and cooperating agencies and their travel-related costs for pronghorn relocation activities;
- transportation of Sonoran pronghorn from Cabeza Prieta NWR to BMGR-East holding pen for release due to uncertainty as to how many times this may occur and method of transportation (*i.e.* helicopter or truck-and-trailer);
- veterinarian and anaesthesia for pronghorn relocations;
- radio collars; and
- “down time” for helicopter waiting for pronghorn to be captured for transport.

## 3.9 Cultural Resources

Cultural resources are associated with human use of an area. They may include archaeological sites or ethnographic locations associated with past and present use of an area. A cultural resource can be physical remains, intangible traditional use areas, or entire landscape, encompassing past cultures or present, modern-day cultures. Physical remains of cultural resources are usually referred to as archaeological sites or historic properties. A traditional cultural property is generally one that is associated with cultural practices or beliefs of a living community that "are rooted in that community's history and ...are important in maintaining the continuing cultural identity of the community" (Parker and King, 1998). These properties are of traditional religious and cultural importance to an Indian tribe (National Historic Preservation Act, as amended, 1992).

Three Native American communities responded to the October 2008 project scoping letter: Tohono O’odham Nation, Yavapai-Apache Nation, and Ak-Chin Indian Community. No Native

American concerns regarding either Area A or Area D were identified in these letters. In May 2009, the Tohono O’odham Cultural Affair Program Manager requested a cultural resource survey for the proposed pen site at BMGR-East (K. Howe, Ecologist, Tohono O’odham Nation, pers. comm. 01 May 2009).

### 3.9.1 Existing Conditions

**3.9.1.1 Area A** A record search indicates that the proposed project area and surrounding King Valley has not been the subject of archaeological investigations, and, therefore, no archeological or historic sites have been recorded in the area (D. Siegel, Service, Region 2 Archaeologist, pers. comm., 8 May 2009). The nearest recorded archeological site is about 10 miles from the project area. The nearest reliable survey was about 20 miles from the project, although a one-person reconnaissance visit was conducted somewhere in the King Valley by an early archeologist from the San Diego Museum of Man, in the 1930s and 1940s. Field notes from the latter reconnaissance visits are vague or non-existent and not usable for this project area.

Most archeological sites found elsewhere on Kofa NWR reflect temporary uses, such as hunting, gathering, and resource procurement and processing. A few sites may have served some ceremonial or mortuary function (D. Siegel, Service, Region 2 Archaeologist, pers. comm., 8 May 2009). The widely-dispersed, temporary use sites consist of surface artifact scatters, rock rings and alignments, trails, cleared areas, petroglyphs, and pictographs, rock cairns and clusters, and artifact caches. There are no recorded sites with any occupational depth, and no sites with high densities of surface artifacts and/or features pointing to permanent or long-term occupation. There is no evidence to suggest that the lands that now comprise Kofa NWR were utilized for anything more than temporary camps and limited

activities, or for travel, by small groups and individuals (D. Siegel, Service, Region 2 Archaeologist, pers. comm., 8 May 2009).

**3.9.1.2 Area D** A records check of Luke AFB archaeological files indicates that no cultural resource surveys or archival research have been conducted in the proposed project area, and no archeological or historic sites have been recorded (A. Rankin, Archaeologist, Luke AFB, pers. comm., 22 May 2009). Two cultural resource surveys were recently completed or are nearing completion for about 80 miles of roadway in the vicinity of the proposed project, including portions of S.R. 85 and other BMGR-East roads that would be used for access to the pen site. These two surveys recorded 31 prehistoric and historical-period sites and hundreds of isolated artifacts. As a result of these surveys, it is anticipated that prehistoric artifact scatters and isolated artifacts, as well as historic-period sites, including Sloven Well Ranch, would be found in the project area (A. Rankin, Archaeologist, Luke AFB, pers. comm., 22 May 2009).

## 3.9.2 Effects on Cultural Resources

**3.9.2.1 Alternative I** The No Action alternative would not affect cultural resources, including traditional cultural properties, as there would be no new actions taken towards reestablishing Sonoran pronghorn populations.

**3.9.2.2 Alternatives II and III** If either action alternative is selected but prior to signing the final decision, an archaeological survey of areas to be affected by construction of a captive-breeding pen, a holding pen, and associated developments (*e.g.* wildlife waters, forage plots, wells, or irrigation lines) would be undertaken. All consultation with the Arizona State Historic Preservation Officer under Section 106 of the

National Historic Preservation Act, as well as consultation with tribal groups, would be completed before a Finding of No Significant Impact is issued.

Release and reestablishment of Sonoran pronghorn in the wild, whether in Area A or Area D, would not be expected to result in any effects to pre-historic or historic cultural resource sites or Traditional Cultural Properties during the 10-year analysis period.

## 3.10 Recreation, Wilderness, and Public Access

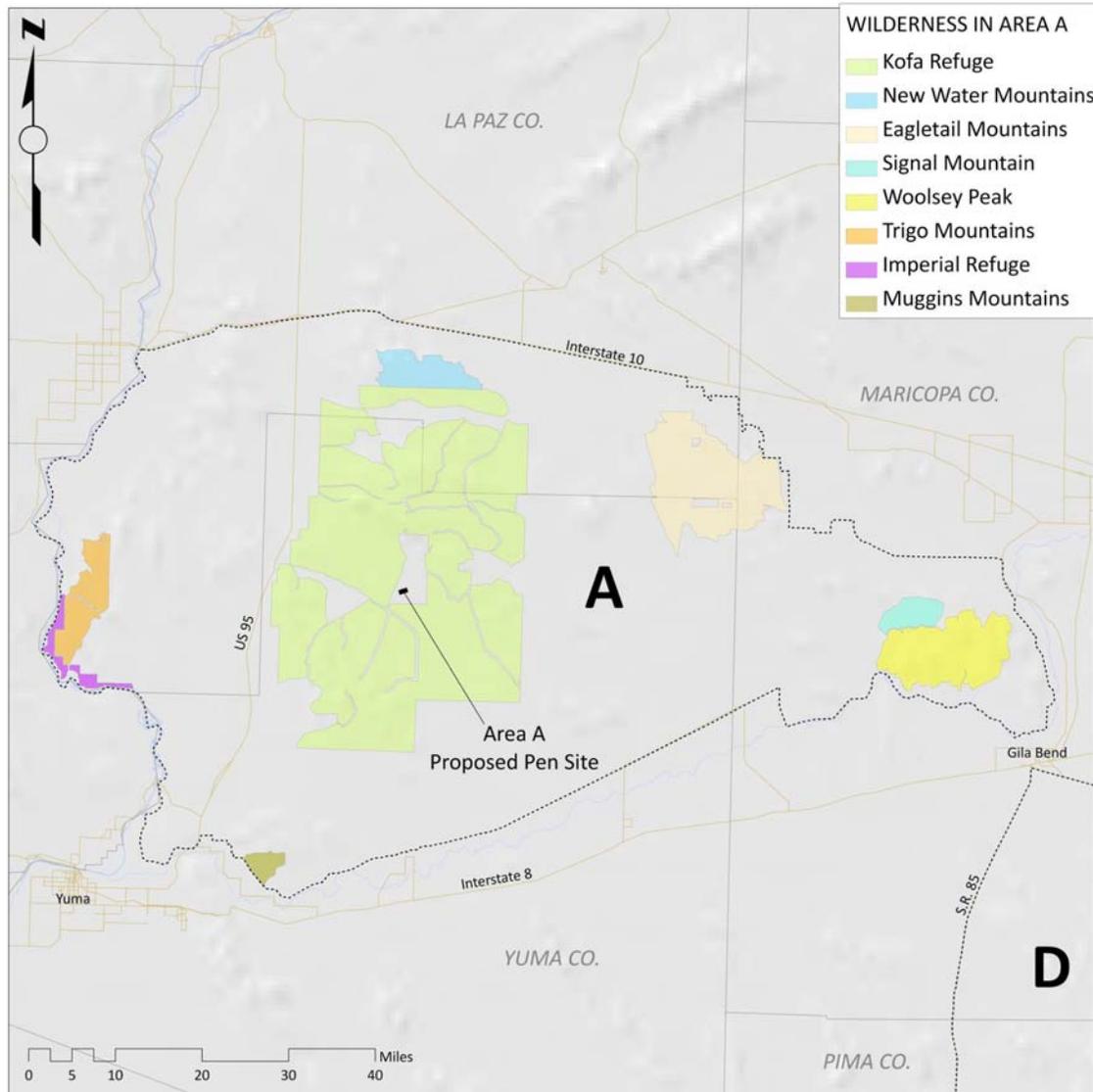
### 3.10.1 Existing Conditions

**3.10.1.1 Area A** Area A includes eight federally designated Wilderness areas: Kofa, Imperial, New Water Mountains, Trigo Mountains, Eagletail Mountains, Muggins Mountains, Signal Mountain, and Woolsey Peak (Table 18; Figure 19). Kofa Wilderness and Imperial Wilderness are part of the Kofa NWR and Imperial NWR, respectively, both of which are managed by the Service. The remaining Wilderness areas are located on BLM lands. All but two are managed by the Yuma Field Office of the Colorado River District; the Lower Sonoran Field Office of the Phoenix District manages Signal Mountain Wilderness and Woolsey Peak Wilderness.

**Table 18.** Federal Wilderness areas potential Sonoran pronghorn reintroduction areas A and D.

WILDERNESS AREA	SIZE (ACRES)	LAND MANAGEMENT AGENCY
<b>AREA A</b>		
Kofa	534,814	USFWS - Kofa NWR
Imperial Refuge	9,125	USFWS - Imperial NWR
New Water Mountains	24,653	BLM - Yuma Field Office
Trigo Mountains	30,137	BLM - Yuma Field Office
Eagletail Mountains	98,098	BLM - Yuma Field Office
Muggins Mountains	7,003	BLM - Yuma Field Office
Signal Mountain	13,367	BLM - Lower Sonoran Field Office
Woolsey Peak	63,942	BLM - Lower Sonoran Field Office
TOTAL - AREA A	781,139	
<b>AREA D</b>		
Table Top	34,331	BLM - Lower Sonoran Field Office

**Figure 19.** Federal Wilderness areas located within Area A.



These eight Wilderness Areas have a combined total of 781,139 acres (Table 18), which is about 25.5 percent of Area A. About 23 percent of the potential habitat for Sonoran pronghorn as indicated by the CART model, or 413,102 acres, is located within designated Wilderness in Area A.

Kofa NWR encompasses 665,400 acres (Bureau of Land Management *et al.*, 1996: 32) of which about 534,814 acres (80 percent) are within designated Wilderness. Kofa Wilderness was officially designated a federal wilderness area with passage of the Arizona Desert Wilderness Act of 1990 (P.L. 101-628). Although more than a half-million acres, Kofa Wilderness is divided into about a dozen parcels (Figure 19) separated by a network of “cherry-stemmed” unpaved roads that access various non-Wilderness parts of the Refuge. The Wilderness boundary is typically located 100 feet from either edge of a road in these “cherry-stemmed” areas.

At Kofa NWR, hiking, sightseeing, photography, and nature observation are permitted in all areas of the Refuge except on patented mining claims and other private inholdings. Camping is permitted on the Refuge, but camp sites, whether with a vehicle or backpacking, are restricted from being located within 0.25 mile of water holes. Vehicles must remain within 100 feet of designated roads. No off-road vehicle use is allowed. Hunting is permitted in accordance with State and Refuge regulations for quail, cottontail rabbit, bighorn sheep, mule deer, coyote, and fox; all other wildlife is protected. Hunting seasons for the Refuge are set by Arizona Game and Fish Department hunting regulations. Three Arizona Game and Fish Department Game Management Units (45A, 45B, and 45C) are located within Kofa NWR.

From 1998 through 2008, nine to 17 permits were issued each year for hunting bighorn sheep on

Kofa NWR for the three combined Unit 45 areas, which comprise the majority of the Refuge (L. Smythe, Kofa NWR, pers. comm., 1 May 2009). Six bighorn sheep permits have been issued by the Arizona Game and Fish Department for Units 45A, 45B, and 45C for the 2009 hunting season. From the 1998 through 2009 hunting seasons, 200 to 300 permits were issued in Unit 45 for the rifle deer hunt.

Traffic counters at all six entrances to the Refuge are used by the Service to estimate visitor use days at Kofa NWR. A visitor-use day is one person for one day. The information from the traffic counter located at the King Valley entrance was used to estimate visitor use to the general area of the proposed pen in Area A. Table 19 shows the number of visitor use days to King Valley based on traffic counts from 1998 through 2008.

**3.10.1.2 Area D** One Wilderness area, Table Top Wilderness, is located within Area D (Figure 20). Table Top Wilderness Area is 34,331 acres and is managed by the BLM - Lower Sonoran Field Office. Federal Wilderness constitutes about 2.3 percent of Area D. Recreational uses of the Table Top Wilderness include backpacking, horseback riding, hiking, hunting, and other day uses. In 2008, the BLM recorded 1,349 visitors to this Wilderness area (L. Young, BLM - Lower Sonoran Field Office, pers. comm., 22 April 2009). The Table Top Wilderness contains about two percent (19,021 acres) of the potential habitat for Sonoran pronghorn, as indicated by the CART model, in Area D.

**Table 19.** Estimated visitor use days to King Valley, Kofa NWR, 1998-2008.

YEAR	NUMBER OF VISITOR DAYS
1998	9,384
1999	9,084
2000	9,352
2001	10,955
2002	8,906
2003	8,822

YEAR	NUMBER OF VISITOR DAYS
2004	7,741
2005	9,462
2006	9,193
2007	8,608
2008	8,315

About 21 percent of Area D is within BMGR-East (Table 3). Public access to certain portions of BMGR-East, as well as BMGR-West and Cabeza Prieta NWR, is allowed through a recreational permit system managed jointly by six agencies or offices: Marine Corps Air Station Yuma, Luke AFB, Gila Bend Auxiliary Field, Cabeza Prieta NWR, BLM - Lower Sonoran Field Office, and Explore Arizona (a BLM program administered by the BLM Arizona State Office). Together, these offices issued 7,927 permits from 1 October 2007 through 30 September 2008 (T. Walker, Luke AFB, pers. comm., 1 April 2009). More than 90 percent of these permits were issued by Marine Corps Air Station Yuma. It is assumed that the majority of the permits issued by that office were for access to BMGR-West, although a permit issued by any of the offices may be used for any permitted area.

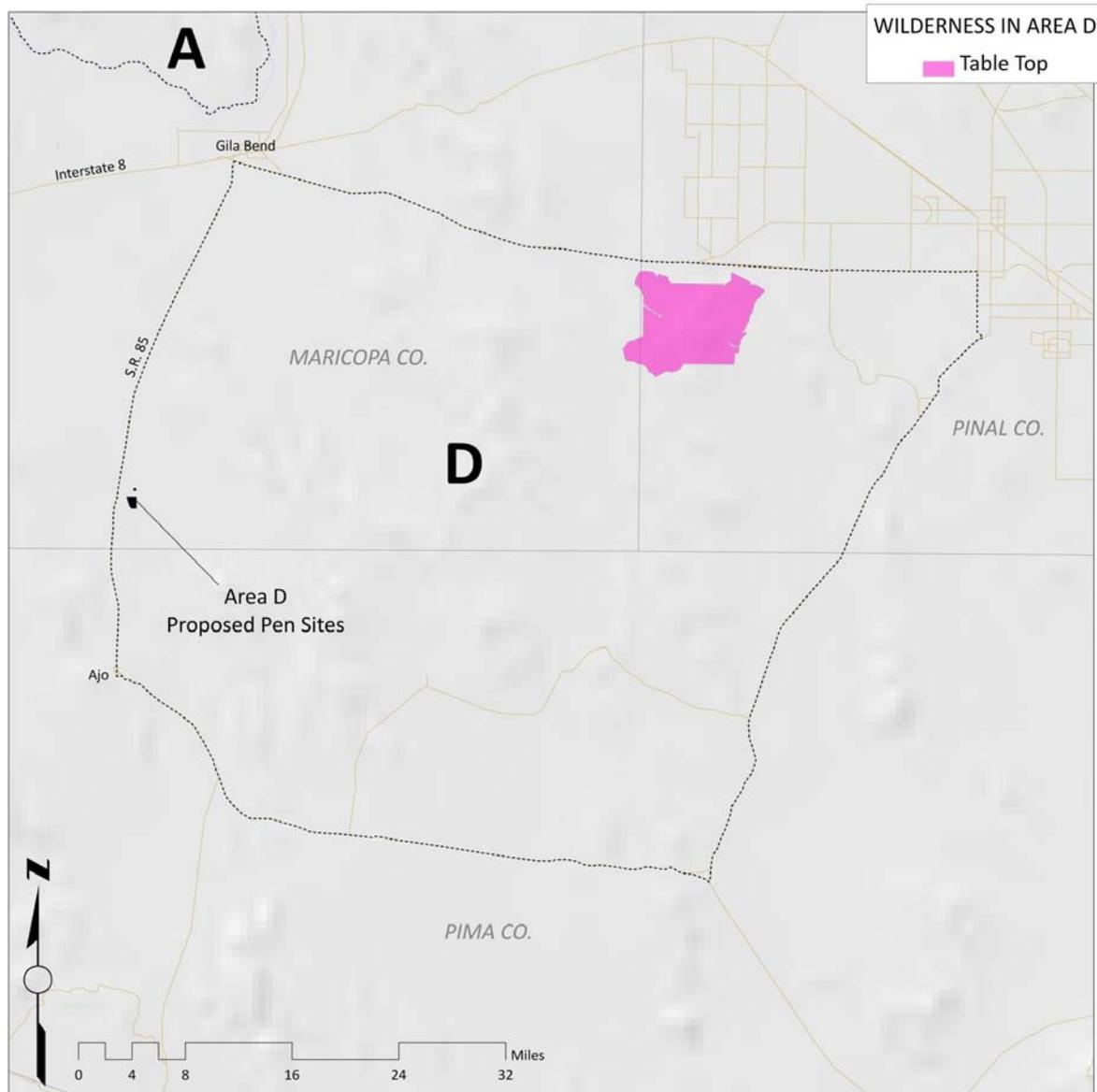
The remaining five permit-issuing offices, which are more closely associated with BMGR-East, issued 736 public access permits during fiscal year 2008. The number of recreational permits issued by the five east-side agencies or offices dropped about 37 percent from 1,204 permits issued in 2007, but the number issued by Marine Corps Air Station Yuma in 2008 increased about

34 percent from 5,361 in 2007 (T. Walker, Luke AFB, pers. comm., 24 April 2009).

Permits are good for access for one year and allow such activities as hunting (with proper state license), camping, hiking, sightseeing, and wildlife viewing. No off-road vehicle use is allowed. Visitation to military targets, target areas, battlefield simulations, buildings, towers, and transmitters is also prohibited.

BLM lands in Area D are administered by the Phoenix District Office under the Lower Gila South Resource Management Plan/EIS approved in 1988 (Bureau of Land Management, 1988). Those lands support multiple uses including various recreation pursuits, such as camping, horseback riding, hunting, and off-road vehicle riding.

**Figure 20.** Federal Wilderness areas within Area D.



## 3.10.2 Effects on Recreation, Wilderness, and Public Access

**3.10.2.1 Alternative I** There would be no effect to designated Wilderness areas, Wilderness users, recreation uses, or public access with the No Action alternative as none of the proposed actions would be implemented and no changes in the existing conditions or current management would occur.

**3.10.2.2 Alternative II** Construction and operation of a captive-breeding pen in Kofa NWR and a holding pen in BMGR-East would result in establishment of a 0.5-mile buffer around each pen perimeter. Within this buffer zone, public access would be prohibited in order to reduce human interaction with the captive animals. Combined with the 0.5-mi<sup>2</sup> pen, this would restrict public use from an approximately 3.0-mi<sup>2</sup> (1,920-acre) area in Area A. In Area D, the restricted area would be about 180 acres in size. These restrictions would not be expected to affect public access or recreation use in either area.

All other areas at Kofa NWR and BMGR-East that are currently open to the public (some by permit) would remain accessible. No road closures would occur on either Kofa NWR or BMGR-East. Off-road vehicle use, which is prohibited in both areas, would continue to be prohibited. Opportunities for camping, hunting, sightseeing, hiking, and other currently-sanctioned recreational pursuits would remain unchanged throughout areas A and D.

This alternative would construct a 320-acre captive-breeding pen with several 25-foot tall observation towers near the Kofa Wilderness which may be visible from higher points in the Wilderness. However, higher elevations from which the pen may be visible are quite distant from the pen (*ca.* five to six miles, straight-line

distance, from the pen to the crest of the Kofa Mountains to the north). This distance, along with fabric sides that would make the pen less obvious than galvanized steel metal fencing, would combine to make the potential visible intrusion of the pen a fairly remote effect on Wilderness visitors. There would be increased human activity during pen construction and operation in the non-Wilderness portion of Kofa NWR where the pen is proposed for location, but this is not expected to materially detract from the Wilderness visitor experience because it would represent only a small increase over existing human use of the nearby King Road.

Reestablishing wild herds of Sonoran pronghorn in Area A and/or Area D may enhance the visitor experience if the rare animals are seen by visitors, whether within or outside of Wilderness. Along with the Kofa Wilderness, the New Water Mountains Wilderness, Eagletail Mountains Wilderness, Signal Mountain Wilderness, and Woolsey Peak Wilderness all have some potential habitat for Sonoran pronghorn.

About 11 helicopter flights over the Kofa Wilderness during a two-month period in the winter of 2010-2011 would be required to transport Sonoran pronghorn from Cabeza Prieta NWR to the new captive-breeding pen. Additional flights would be needed to replace the breeding male (every two years) or pronghorn that do not survive relocation to the pen. Additionally, pronghorn released either from the captive-rearing pen in Area A or transported to the Area D holding pen and released would require bi-monthly monitoring by low-level (*i.e.* 1,000 ft altitude) overflights. These flights may detract from Wilderness quiet and solitude for some visitors.

Reestablishment of pronghorn populations at either or both locations would be expected to contribute to the overall health of the Sonoran

pronghorn population and thereby make it possible to remove seasonal travel restrictions that are currently imposed during fawning at Cabeza Prieta NWR.

**3.10.2.3 Alternative III** Effects on public access, recreation activities, and Wilderness from implementation of Alternative III would be very similar to Alternative II. A 0.5-mile buffer zone would be established around the captive-breeding pen to reduce human interaction with the captive animals. Combined with the 0.5 mi<sup>2</sup> pen, this would restrict public use from an approximately 3.0-mi<sup>2</sup> (1,920-acre) area in Area D. The effect of this restriction would be negligible on public access and recreation use.

All other areas on BMR-East that are currently open to the public by permit would remain accessible. No road closures would occur on BMGR-East and off-road vehicle use would continue to be prohibited. Opportunities for camping, hunting, sightseeing, hiking, and other currently-sanctioned recreational pursuits on BMGR-East and BLM lands would remain unchanged throughout Area D.

Table Top Wilderness would not be affected by the proposed project nor would visitors to that Wilderness area. As Table Top Wilderness does contain potential habitat for Sonoran pronghorn, reestablishment of another population in Area D may result in pronghorn moving into this Wilderness. If that condition occurs, Wilderness users would have the potential to see this rare, native ungulate in its historic habitat, which likely would enhance the Wilderness visitor experience.

## 3.11 Military Operations

### 3.11.1 Existing Conditions

**3.11.1.1 Area A** Yuma Proving Ground (YPG), a U.S. Army installation, is located nearly entirely within Area A. The Yuma Test Center is the largest of three components of YPG; the other two test units are located in tropical and cold climates. The Yuma Test Center is a multi-purpose test complex where a wide range of weapon systems and munitions are tested, including long-range artillery, missile-firing aircraft, cargo and personnel parachutes, direct-fire weapons, unmanned aerial systems, and technologies to defeat roadside bombs. Nearly 100 individual tests are ongoing at any single time (U.S. Army, 2009).

The YPG Yuma Test Center covers about 1,300 mi<sup>2</sup> of terrain and 2,000 mi<sup>2</sup> of airspace, making it one of the largest ranges in the Department of Defense (U.S. Army, 2009). Testing of artillery, cargo and personnel parachutes, and unmanned aerial systems frequently requires use of the airspace over the southern portion of Kofa NWR.

Almost all of YPG is contained within in Area A. Lands managed by YPG constitute about 27 percent of Area A. About 58 percent (757 mi<sup>2</sup>) of YPG lands that are within Area A are potential habitat for Sonoran pronghorn, as indicated by the CART model.

**3.11.1.2 Area D** The Barry M. Goldwater Range is a tactical aviation training range complex for U.S. and allied pilots. The land area of the range consists of 1.7 million acres, of which the eastern 1.05 million acres (BMGR-East) is administered by the U.S. Air Force. The western 650,000 acres (BMGR-West) is administered by the U.S. Marine Corps. The restricted airspace that defines the capabilities of the range is

approximately 2.7 million acres, overlying BMGR-East, BMGR-West, and most of Cabeza Prieta NWR.

The range complex is the nation's second largest military reservation. Periodic Congressional actions since the range was established in September 1941 allows the land to be withdrawn from other public uses, such as mining, ranching, farming and agriculture, that have been deemed incompatible with the military training activities.

Military activities include dropping practice bombs and live ordnance, but only about two percent are the latter. About six percent of BMGR-East is intensively used for roads, targets and support areas. The remaining 94 percent is relatively undisturbed Sonoran Desert (U.S. Air Force, 2009).

About 17 percent of BMGR-East (*ca.* 502 mi<sup>2</sup>) is located in Area D. Lands managed by BMGR-East constitute about 21 percent of Area D. About 52 percent (262 mi<sup>2</sup>) of the BMGR-East lands that are within Area D are potential habitat for Sonoran pronghorn, as indicated by the CART model.

### 3.11.2 Effects on Military Operations

**3.11.2.1 Alternative I** The no action alternative would not affect any military operations as no changes would occur with respect to reestablishment of Sonoran pronghorn.

#### **3.11.2.2 Alternatives II and III**

Translocation and release of Sonoran pronghorn in areas A and/or D would have no effect on military operations in those areas because all released animals would be classified as nonessential experimental under section 10(j) of the ESA. All of the potentially affected lands on YPG and BMGR-East would be within the

nonessential experimental population area (*cf.* Figure 13). As discussed in section 2.2.4:

"Pronghorn may be taken within the nonessential experimental population area when it is incidental to, and not the purpose of, carrying out an otherwise lawful activity within the boundaries of Yuma Proving Ground, BMGR-East,..."

There would be no requirement for consultation or conferencing under section 7 of the ESA as a result of either alternative because the released animals would be part of a population that would be, by definition, not essential to the continued survival of the species. The only requirement that would be in place would be to report incidental take to the Service in the unlikely event that it would occur as a result of military operations within areas A and D. Constructing and operating a captive-breeding or holding pen at BMGR-East in Area D, and establishing another population of Sonoran pronghorn there, is not expected to alter operations at BMGR-East or cause additional, substantive management impacts. The expansion of the distribution and abundance of Sonoran pronghorn as a result of either action alternative may serve to reduce the existing management constraints at BMGR-East that are associated with conservation measures implemented for Sonoran pronghorn within its current U.S. range.

---

## 3.12 Livestock Grazing

### 3.12.1 Existing Conditions

**3.12.1.1 Area A** Livestock grazing occurs throughout portions of Area A. Federal grazing allotments in Area A are located on BLM lands; livestock grazing is not allowed within Kofa NWR nor Yuma Proving Ground. Private, state, and tribal lands in Area A may also be used for livestock grazing.

As of May 2009, there were 28 BLM grazing allotments that were located at least partially within the boundaries of Area A (Figure 21). Twelve of these are administered by the Yuma Field Office and 16 are administered by the Lower Sonoran Field Office. The Yuma Field Office is currently undergoing a revision of their Resource Management Plan. The new plan, if approved, would eliminate eight of those 12 allotments within Area A (Bureau of Land Management, 2008).

The existing 28 BLM grazing allotments include about 1,296,959 acres in Area A. Of those, approximately 790,890 acres (61 percent) are potential habitat for Sonoran pronghorn according to the CART model. All 28 allotments contain at least some potential habitat. About 44 percent of the Sonoran pronghorn potential habitat in Area A occurs within BLM livestock grazing allotments.

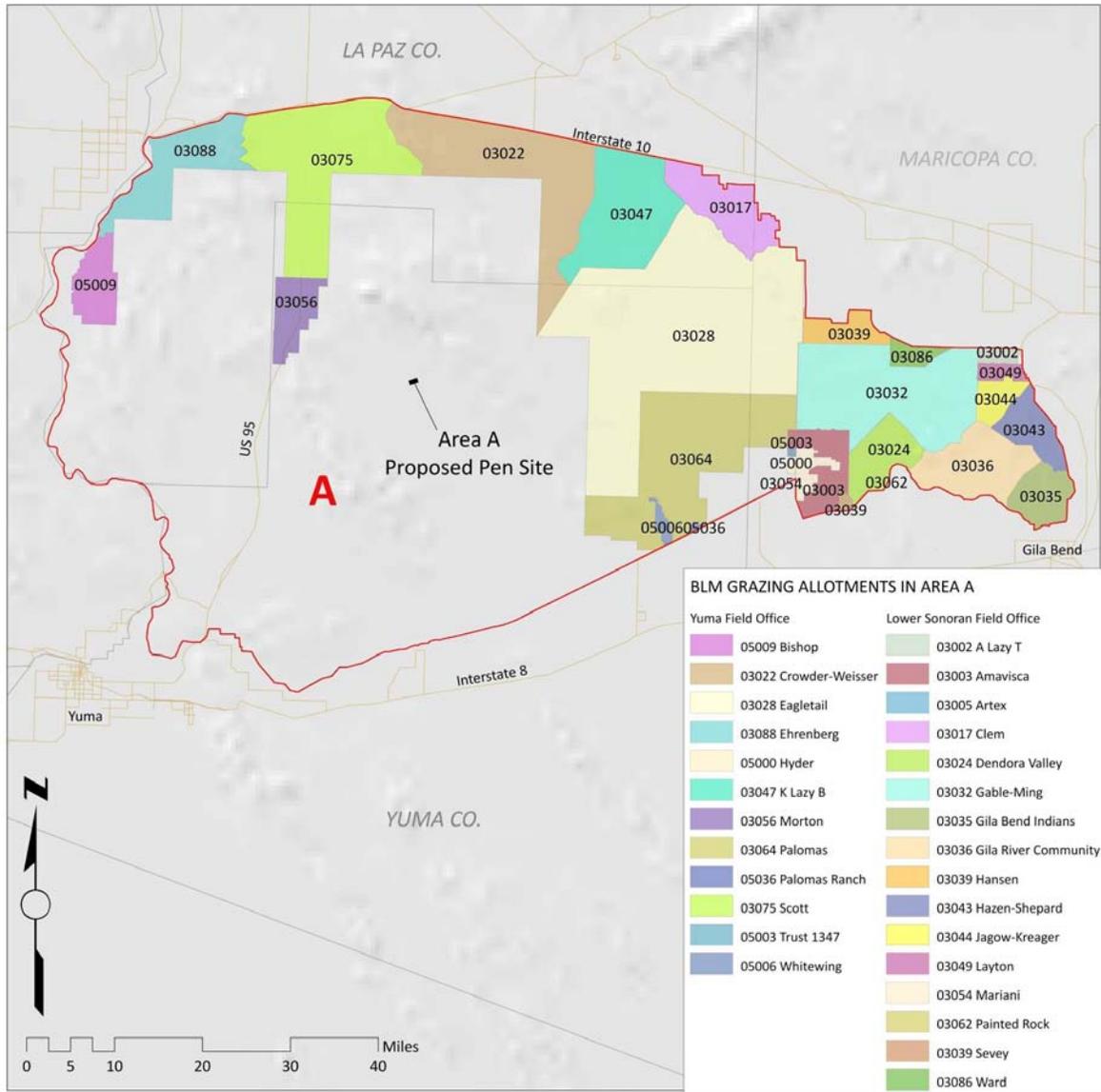
BLM livestock grazing allotments may be issued as perennial, ephemeral, or a combination of perennial-ephemeral. Perennial allotments have authorized a base herd size that may be grazed annually on the allotment. Authorization of ephemeral allotments is discretionary, based on forage conditions and other factors. Permittees with perennial-ephemeral allotments may graze their base herd each year and then apply for permission to graze additional animals based on

annual forage conditions. Of the 28 current grazing allotments in Area A, five are perennial, 16 are ephemeral, and seven are perennial-ephemeral. If the new Yuma Field Office Resource Management Plan is approved, Area A would contain all or parts of two perennial, 11 ephemeral, and seven perennial-ephemeral allotments.

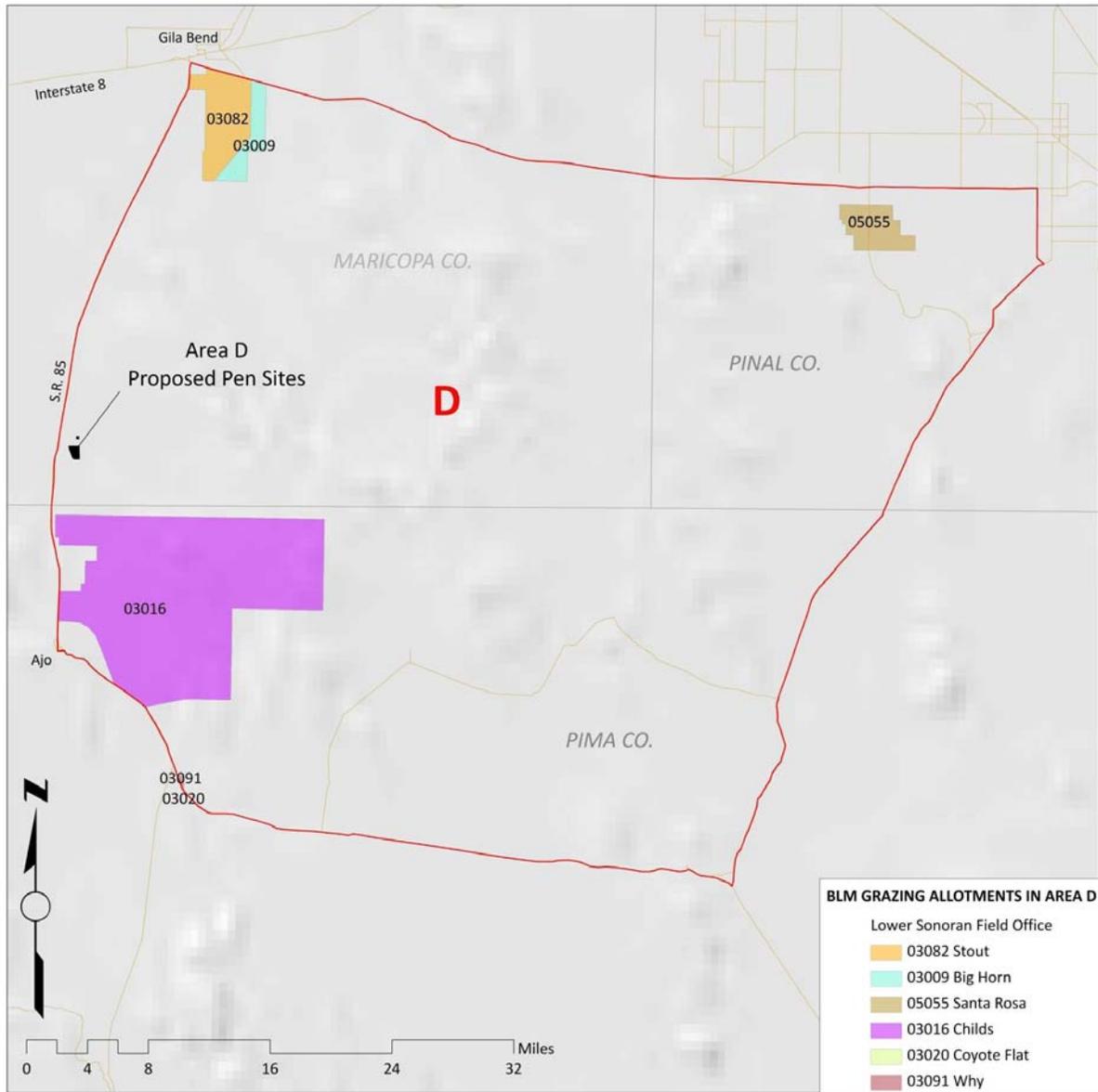
**3.12.1.2 Area D** As of May 2009, there were six BLM grazing allotments located at least partially within the boundaries of Area D (Figure 22), all of which are administered by the BLM Lower Sonoran Field Office. These six allotments include approximately 122,148 acres within Area D. The CART model shows that about 64,497 acres (53 percent) of the BLM grazing allotment acres in Area D are suitable Sonoran pronghorn habitat. All six allotments have at least some potential habitat for Sonoran pronghorn with about 17 percent of all potential habitat in Area D occurring within these allotments. Of the six grazing allotments in Area D, one is perennial, two are ephemeral, and two are perennial-ephemeral.

Private, state, and tribal lands in Area D may also be used for livestock grazing. Livestock grazing is not allowed within BMGR-East, although some trespass cattle do occur there.

**Figure 21.** BLM livestock grazing allotments in Area A.



**Figure 22.** BLM livestock grazing allotments in Area D.



## 3.12.2 Effects on Livestock Grazing

**3.12.2.1 Alternative I** The No Action alternative would not affect livestock grazing on private, state, tribal, or federal lands as there would be no actions taken towards reestablishing Sonoran pronghorn.

**3.12.2.2 Alternative II** Construction and operation of a captive-breeding pen at Kofa NWR and a holding pen at BMGR-East would not affect livestock grazing in Area A or Area D as no BLM allotments are located within the proposed pen areas.

Translocation and release of Sonoran pronghorn in areas A and/or D would have no effect through the ESA on livestock grazing in those areas because all released animals would be classified as nonessential experimental under section 10(j) of the ESA. All of the potentially affected BLM grazing allotments and livestock grazing on private or state lands would be within the nonessential experimental population area (*cf.* Figure 13). As discussed in section 2.2.4:

"Pronghorn may be taken within the nonessential experimental population area when it is incidental to, and not the purpose of, carrying out an otherwise lawful activity within the boundaries of ... lands of the Arizona State Land Office, BLM lands, privately-owned lands, and lands of the Tohono O'odham Nation, Colorado River Indian Reservation, Ak-Chin Indian Reservation, Pascua Yaqui Indian Reservation, and San Xavier Indian Reservation within the nonessential experimental population area (Figure 13)."

There would be no requirement for the BLM to consult or confer under section 7 of the ESA as a result of either alternative because the released

animals would be part of a population that would be, by definition, not essential to the continued survival of the species. The only requirement that would be in place would be to report incidental take to the Service in the unlikely event that it would occur as a result of livestock grazing within areas A and D. Lawful livestock grazing on state, private, or tribal lands would not be affected because there would be no prohibition of take associated with these activities within the nonessential experimental population area.

However, reestablishment of additional Sonoran pronghorn populations in Area A and/or Area D may affect issuance of ephemeral grazing permits and leases on BLM lands aside from ESA considerations. Effects on ephemeral grazing allotments may be a reduction in livestock permitted for grazing in a given year or possibly a reduction in ephemeral permits issued if Sonoran pronghorn are utilizing the forage of a given allotment.

Perennial grazing permits and leases, which are reviewed for reissuance every 10 years, may be affected by establishment of additional Sonoran pronghorn populations in Area A and/or Area D. When reviewing and studying the options for reissuing a perennial livestock grazing permit or lease, the BLM would consider the presence of Sonoran pronghorn which may influence the conditions under which the permit or lease is renewed. For example, the BLM would insert stipulations on new range improvement authorizations that would require new fences to be wildlife-friendly and would place height requirements on water troughs. Renewal of the permit may also offer an opportunity to remove or alter fences for the benefit of pronghorn recovery.

**3.12.2.3 Alternative III** Construction and operation of a captive-breeding pen at BMGR-East would not affect livestock grazing in Area D as the pen site is not within any BLM allotments. Potential effects on both perennial and ephemeral

BLM livestock grazing permits and leases as a result of release of captive-bred Sonoran pronghorn would be similar to those described for Alternative II but to a lesser extent due to fewer grazing allotments (six) in Area D compared to Area A, which contains portions of 28 allotments.

## 3.13 Hazardous Materials

### 3.13.1 Existing Conditions

Neither Area A nor Area D proposed pen sites have had a Phase I initial site assessment conducted for identifying the presence of potentially-hazardous materials. Officials at land management agencies responsible for each area where construction is proposed (*i.e.* Kofa NWR and BMGR-East) are not aware of any past land uses that would give reason to suspect that hazardous materials are present.

### 3.13.2 Effects on Hazardous Materials

**3.13.2.1 Alternative I** The No Action alternative would not have any effect on or contribute to the presence of hazardous materials at either Kofa NWR or BMGR-East.

**3.13.2.2 Alternatives II and III** Neither of the action alternatives is expected to have any effect on hazardous materials at either the Kofa NWR or BMGR-East pen sites as none are known to be present. Risk of accidental release of hazardous materials (*e.g.* petroleum products) during construction would be minimized to the fullest extent possible. If previously-unidentified hazardous waste sites are discovered during the construction portion of this project, the Service would immediately notify the Arizona Department of Environmental Quality. Release of Sonoran

pronghorn into wild areas adjacent to the pen sites would not have any effect on hazardous materials.

## 3.14 Cumulative Effects

This section presents an analysis of the cumulative impacts of the direct and indirect effects of the two action alternatives when added to the aggregate effects of past, present, and reasonably foreseeable future actions (*cf.* 40 CFR 1508.7). For all resources, the aggregate effect of past and present actions was considered to be represented by the current, existing condition of the resource (Council on Environmental Quality, 2005). Therefore, the specific effects of individual past and present actions are not cataloged in detail in the analysis. In order for direct or indirect effects to incrementally add to the effects of past, present, or reasonably foreseeable future actions, they must overlap with those effects in time or space (Council on Environmental Quality, 1997). No specific cumulative effects issues were identified during scoping.

The time frame for analysis of cumulative effects varied, depending on the duration of direct and indirect effects. For example, direct effects resulting from construction of a captive-breeding pen and associated facilities were expected to persist for relatively short periods of time (up to about three months). Conversely, indirect effects resulting from operation of a captive-breeding pen facility were projected to persist for 10 years. Similarly, the geographic bounds for cumulative effects analysis varied with the resource under consideration, depending on zone of influence of the direct or indirect impact being analyzed.

The interdisciplinary team identified planned future actions that may be implemented in the action area. Because the team consisted of representatives from all of the major land management entities in the action area, this list

was considered representative of future actions that could reasonably be implemented in the action area in the foreseeable future (Table 20).

Only resource categories that are potentially affected by the action alternatives are analyzed for cumulative effects. Consequently, there is no cumulative effects analyses for cultural resources, recreation and public access, military operations, and hazardous materials. The cumulative effects analysis is presented in Table 21.

**Table 20.** List of reasonably foreseeable future actions planned in the action area.

REASONABLY FORESEEABLE FUTURE ACTION	AREA OF POTENTIAL EFFECT
1. Solar Energy Developments on BLM Land	Eastern half of Area A
2. Transportation Plan - Maricopa County Council of Governments	Eastern quarter of Area A
3. BLM Transportation Management Plan	All BLM lands in action area
4. U.S. 95 Improvements - AZ Dept. of Transportation	North-south road through western third of Area A
5. F35 Joint Strike Fighter Overflights	Area D
6. Gas pipeline maintenance	Northern part of Kofa NWR in Area A
7. Update of Master Plan and EIS for YPG	Area A
8. Update of Conservation Plan for Kofa NWR in 2012	Kofa NWR in Area A
9. Mountain Lion/Predator Control EA for Kofa NWR	Kofa NWR in Area A
10. Temporary and permanent waters for bighorn sheep	Kofa NWR in Area A
11. BLM Yuma Field Office Resource Management Plan Revision	Area A

**Table 21.** Summary of cumulative effects of the action alternatives.

Resource	Effects of Past and Present Actions	Effects of Action Alternatives	Effects of Future Actions	Cumulative Effects
<p><b>Conservation Status of Sonoran Pronghorn</b></p>	<p>Past actions that contributed to the marked decline of Sonoran pronghorn included unregulated hunting and over-harvest, habitat degradation from overgrazing and water withdrawal, and habitat fragmentation. The effects of these actions occurred primarily from the mid-1880s through the 1930s.</p> <p>Past actions that aided in the conservation of Sonoran pronghorn included federal land withdrawal of about 2.5 million acres from 1937 to 1943, which protected the existing remaining range of Sonoran pronghorn. Livestock grazing in the withdrawn area ceased in the 1980s.</p> <p>The population declined to an all-time low in 2002, at which point numerous conservation measures were implemented that stabilized the declining population, most importantly the development of a captive-breeding program on Cabeza Prieta NWR.</p> <p>There are 2,437 square miles of potential habitat available to Sonoran pronghorn within the current U.S. range. Current trend of population is improving.</p>	<p><u>Alternative II</u></p> <p>Would result in establishment of two additional populations of Sonoran pronghorn within its historic range.</p> <p>Potential for successful establishment of a second population of Sonoran pronghorn is high.</p> <p>Would increase potential habitat available to Sonoran pronghorn to 7,405 square miles.</p> <p><u>Alternative III</u></p> <p>Would result in establishment of one additional population of Sonoran pronghorn within its historic range.</p> <p>Potential for successful establishment of a second population of Sonoran pronghorn is moderate.</p> <p>Would increase potential habitat available to Sonoran pronghorn to 3,939 square miles.</p>	<p>Reasonably foreseeable future actions 1-9 (Table 20) may reduce habitat suitability in portions of Area A. This is particularly the case for solar right-of-way applications, which cover substantial acreage on BLM lands in Area A.</p> <p>No reasonably foreseeable future actions identified in Table 20 would reduce habitat suitability for Sonoran pronghorn in Area D. F35 Joint Strike fighters would replace existing F16 fleet.</p>	<p>Alternatives II and III would overlap temporally with ongoing conservation actions for Sonoran pronghorn.</p> <p>Alternative II would incrementally add to the improving trend in conservation status of Sonoran pronghorn in the U.S. This incremental effect would be large, as it would markedly increase distribution and abundance and, therefore, the security of Sonoran pronghorn in the U.S. Planned projects in Area A may reduce habitat suitability in localized areas, but would not substantially affect the potential for successful establishment of a Sonoran pronghorn population there.</p> <p>Alternative III would also incrementally add to the improving trend in conservation status of Sonoran pronghorn in the U.S. This incremental effect would not be as large as Alternative II, as it would be limited to reestablishing Sonoran pronghorn in one area, versus two.</p>

Table 21, continued

Resource	Effects of Past and Present Actions	Effects of Action Alternatives	Effects of Future Actions	Cumulative Effects
<b>Wildlife, Vegetation, and Special-Status Species</b>	The current condition of special-status species, wildlife, and vegetation in the action area represents the aggregated effect of past and present actions.	<p>Alternatives II and III would potentially affect a few individuals of special-status plant or animal species, at most, as the habitat subject to ground disturbance would be creosotebush-bursage vegetation</p> <p>Potential effects on special-status species would likely be immeasurable at the population level because of the small area impacted (20 acres with Alternative II and 15 acres with Alternative III) and short duration of impacts (i.e. a construction period of about three months)</p> <p>The action alternatives would not have any measurable effects on predator species, game species, or invasive weeds.</p>	Reasonably foreseeable future actions 1-9 in Table 20 may result in impacts to special-status species, vegetation, invasive weeds, and wildlife in the action area. However, these effects are not precisely quantifiable because details on impact areas, exact locations, and impact duration are not available.	<p>The ground-disturbing actions of alternatives II and III would not overlap spatially with any reasonably foreseeable future actions.</p> <p>Spatial overlap with effects of past actions, such as livestock grazing, road construction, and fence construction, would result in cumulative impacts to habitat within the area of ground disturbance for each action alternative. However, these cumulative impacts would not significantly alter habitat quality in the area or result in any measurable effects on species at the population level because of their small spatial extent and short duration.</p>
<b>Water</b>	No past or present actions were identified that have influenced groundwater levels or water quality in the affected portions of the action area (i.e. vicinity of the pen sites).	Alternatives II and III would require no more than 15 acre-feet of water per year, which would be predominately groundwater. There are no other wells or water uses in the vicinity of the pen sites that could potentially be affected.	No reasonably foreseeable future actions are proposed in the vicinity of the pen sites that would affect groundwater levels or water quality.	Effects of action alternatives would not overlap in space or time with effects of past, present, or reasonably foreseeable future actions.

Table 21, continued

Resource	Effects of Past and Present Actions	Effects of Action Alternatives	Effects of Future Actions	Cumulative Effects
Air Quality	The areas encompassing the pen sites in areas A and D are currently in attainment of all federal air quality standards.	Alternatives II and III would have minor, short-term increases in fugitive dust, PM <sub>10</sub> particulates, and carbon monoxide.	No reasonably foreseeable future actions are proposed in the areas encompassing the pen sites that would affect air quality.	Effects of the action alternatives would not overlap in space or time with effects of past, present, or reasonably foreseeable future actions
Noise Levels	Area A - low noise level; car/truck engines most prevalent source; occasional military or other overflights Area D - noise level from aircraft and ground-based vehicles varies widely due to level of military activity and atmospheric conditions.	Constructing a captive-breeding pen for either Alternative II or III would result in short-term increases in noise levels in either Area A or D during the three-month construction period.  Operation of the captive breeding pen at either location would increase noise from vehicles and activities used for daily monitoring of the pen.  Constructing a holding pen in Area D (Alternative II) would result in increased noise in the pen vicinity for about three months. The holding pen for Alternative III would not result in noticeable increases in noise level as part of the captive-breeding pen would be used for a holding pen.  Release of pronghorn from the captive-breeding pen or holding pen would increase the number of aircraft overflights for monitoring released animals, contributing to a slight increase in noise in the project area.	Construction activities associated with the reasonably foreseeable future actions identified in Table 20 would result in increased noise levels. However, the magnitude and duration of these effects cannot be quantified because detailed project plans are lacking.	The increase in noise generated by construction in Area A or D would add to noise levels from vehicles on local roads (Areas A and D) and S.R. 85 (Area D), as well as aircraft overflights in both areas. This would result in a cumulative increase in noise levels during the period of construction.

Table 21, continued

Resource	Effects of Past and Present Actions	Effects of Action Alternatives	Effects of Future Actions	Cumulative Effects
Socio-economics and <b>Environmental Justice</b>	Existing conditions described in text represent effects of past and ongoing actions.	There would be no effect from the action alternatives on communities or individuals, no disproportionate adverse effects on low-income or minority populations.  Alternatives II and II would each create two full-time jobs and contribute to local economy from expenditures for implementation of actions over 10 years	The reasonably foreseeable future actions in Table 20 would likely result in economic activity, which may be beneficial to local communities in the areas where they are implemented.	Economic effects of the action alternatives may overlap spatially and/or temporally with reasonably foreseeable future actions and ongoing economic activities, resulting in a minor, potentially beneficial cumulative effect to local economies in the action area.
<b>Livestock Grazing</b>	BLM Lower Sonoran Field Office has closed allotments within the Sonoran Desert National Monument and other allotments in the action area within the last several years.  BLM Yuma Field Office has also closed some grazing allotments in the action area.	BLM may reduce livestock permitted for grazing in a given year or possibly reduce ephemeral permits issued if Sonoran pronghorn are utilizing forage of a given allotment.	Yuma Field Office Resource Management Plan revision would close eight allotments in Area A.	Effects of Alternative II would overlap in space and time with effects of past, present, or reasonably foreseeable future actions to result in cumulative effect of further reducing livestock grazing in Area A.

Table 21, continued

Resource	Effects of Past and Present Actions	Effects of Action Alternatives	Effects of Future Actions	Cumulative Effects
Wilderness	Existing conditions described in text represent effects of past and ongoing actions; no substantial impairment of Wilderness has resulted.	<p>Alternative II would have a small visual impact to part of Kofa Wilderness from 320-acre pen on Kofa NWR, located ca. 5-6 air-miles from crest of Kofa Mtns.</p> <p>Alternative II would also have occasional helicopter flights over Kofa Wilderness associated with operation of captive-breeding pen, which would cause periodic increases in noise disturbance</p> <p>Alternatives II and III would have bi-monthly airplane surveys (1,000-ft altitude) that would cause temporary increases in noise disturbance over potential habitats in Wilderness areas</p> <p>Restoration of Sonoran pronghorn, a native species, to potential habitats in Wilderness areas may enhance visitor experience with both action alternatives</p>	No reasonably foreseeable future actions are proposed that would affect Wilderness areas in the action area	Effects of action alternatives would not overlap in space or time with effects of past, present, or reasonably foreseeable future actions to affect Wilderness.

### 3.15 Irreversible and Irretrievable Commitment of Resources

Irreversible commitments of resources are those effects that cannot be reversed. For example, the extinction of a species is an irreversible commitment.

Irretrievable commitments of resources are those that are lost for a period of time, but may be reversed, such as building a shopping center on farmland. The land cannot be used for farming again until the pavement is removed and soils are restored to productivity. Reestablishment of one or more additional populations of Sonoran pronghorn would result neither in irreversible or irretrievable commitments of resources.

---

## 4.0 COUNCIL ON ENVIRONMENTAL QUALITY ANALYSIS OF SIGNIFICANCE

Pursuant to the Council on Environmental Quality regulations for implementing NEPA, preparation of an environmental impact statement is required if an action is determined to significantly affect the quality of the human environment (40 CFR §1502.3). Significance is determined by analyzing the context and intensity of a proposed action (40 CFR §1508.27).

Context refers to the setting of the proposed action and includes consideration of the affected region, affected interests, and locality (40 CFR §1508.27[a]). The context of both short- and long-term effects of proposed reestablishment of populations of Sonoran pronghorn within its historic range is the action area, as encompassed in its maximum extent by the proposed nonessential experimental population area depicted in Figure 13 and described in section 2.2.4. The effects of proposed reestablishment of populations of Sonoran pronghorn at this scale, although potentially long-term, would be small. Intensity refers to the severity of an impact and is evaluated by considering ten factors (40 CFR §1508.27[b]). The intensity of potential impacts that may result from reestablishment of populations of Sonoran pronghorn within its historic range under alternatives II or III is low.

- The potential impacts may be both beneficial and adverse, but minor. Designation of reestablished populations as nonessential experimental under section 10(j) of the ESA would relax the prohibition of take under section 9 of the ESA for lawful activities within the designated area, as described in section 2.2.4 of this EA.

- There would be no effects to public health or safety from proposed reestablishment of populations of Sonoran pronghorn within its historic range, and the proposed action would not affect unique characteristics of the geographic area.

- Potential impacts from reestablishment of populations of Sonoran pronghorn within its historic range on the quality of the environment are unlikely to be highly controversial and do not involve any uncertain, unique, or unknown risks.

- Proposed reestablishment of populations of Sonoran pronghorn within its historic range does not set a precedent for future actions with significant effects and would not result in significant cumulative impacts.

- Significant cultural, historical, or scientific resources are not likely to be affected by proposed reestablishment of populations of Sonoran pronghorn within its historic range.

- Proposed reestablishment of populations of Sonoran pronghorn within its historic range would have a beneficial effect on Sonoran pronghorn and contribute substantially toward meeting downlisting criteria.

- Proposed reestablishment of populations of Sonoran pronghorn within its historic range would not violate any federal, state, or local laws or requirements imposed for the protection of the environment.

---

## 5.0 EA PREPARERS

This EA was prepared under contract to the U.S. Fish and Wildlife Service, Cabeza Prieta National Wildlife Refuge, by Blue Earth Ecological Consultants, Inc. of Santa Fe, New Mexico. Consultants involved in preparing the EA included:

Karen Yori, Senior Planner (B.A. Social Work, B.S. Forestry)  
John Pittenger, Senior Ecologist (B.S. Biology, M.S. Fisheries Science)

Primary technical editors of and contributors to the EA were:

Jim Atkinson, USFWS, Cabeza Prieta National Wildlife Refuge  
Jill Bright, Arizona Game and Fish Department  
John Hervert, Arizona Game and Fish Department

Other interdisciplinary team members and agency staff who contributed to the EA development were:

Curt McCasland, U.S. Fish and Wildlife Service, Cabeza Prieta National Wildlife Refuge  
Lindsay Smythe, U.S. Fish and Wildlife Service, Kofa National Wildlife Refuge  
Susanna Henry, U.S. Fish and Wildlife Service, Kofa National Wildlife Refuge  
Erin Fernandez, U.S. Fish and Wildlife Service, Arizona Ecological Services Office  
Jim Rorabaugh, U.S. Fish and Wildlife Service, Arizona Ecological Services Office  
David Siegel, U.S. Fish and Wildlife Service, Region 2  
Jeff Young, Bureau of Land Management, Yuma Field Office  
Lori Young, Bureau of Land Management, Lower Sonoran Field Office  
Tim Tibbitts, National Park Service, Organ Pipe Cactus National Monument  
Dan Garcia, U.S. Air Force, Luke Air Force Base  
Aaron Alvidrez, U.S. Air Force, Luke Air Force Base  
Adrienne Rankin, U.S. Air Force, Luke Air Force Base  
Randy English, U.S. Army, Yuma Proving Ground  
Karen Howe, Tohono O'odham Nation

---

## 6.0 CONSULTATION AND COORDINATION

The following agencies and organizations were consulted during the planning process for the Sonoran pronghorn reestablishment project:

U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office (Tucson)  
Bureau of Land Management - Yuma Field Office  
Bureau of Land Management - Phoenix Field Office  
Tohono O'odham Nation  
Hia-Ced O'odham Office of the Tohono O'odham Nation  
Hia-Ced O'odham Alliance  
Gila River Indian Community  
Salt River-Pima Indian Community  
Ak-Chin Indian Community  
Hopi Tribe  
Yavapai Apache Tribe  
Quechuan Tribe  
Cocopah Tribe  
Fort Mojave Tribe  
Colorado River Tribe  
Arizona Game and Fish Department  
Arizona Department of Environmental Quality  
Arizona State Land Department  
Arizona State Historic Preservation Officer  
U.S. Army - Yuma Proving Ground  
U.S. Air Force - Luke Air Force Base  
U.S. Navy - Marine Corps Air Station Yuma  
National Park Service - Organ Pipe Cactus National Monument

---

## 7.0 LITERATURE CITED

- Andrew, N. G., V. C. Bleich, A. D. Morrison, L. M. Lesicka, and P. J. Cooley. 2001. Wildlife mortalities associated with artificial water sources. *Wildlife Society Bulletin* 29(1): 275-280.
- Arizona Department of Environmental Quality. 2009. Air quality plans: nonattainment areas and attainment areas with maintenance plans. [www.azdeq.gov/environ/air/plan/notmeet.html](http://www.azdeq.gov/environ/air/plan/notmeet.html)
- Arizona Department of Water Resources. 2009. GWSI Web Map, Site ID 3222726112502001, Local ID C-11-0624BDA1, Registry ID 600485. <http://gisweb.azwater.gov/gwsi/Default.aspx>, accessed on 29 May 2009.
- Arizona Game and Fish Department. 1981. The Sonoran Pronghorn. Special Report Number 10. Arizona Game and Fish Department, Phoenix, Arizona.
- Arizona Game and Fish Department. 2001a. Sonoran desert tortoise, *Gopherus agassizii*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 10 pp.
- Arizona Game and Fish Department. 2001b. Mexican rosy boa, *Charina trivirgata trivirgata*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 10 pp.
- Arizona Game and Fish Department. 2001c. Cactus ferruginous pygmy owl, *Glaucidium brasilianum cactorum*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 6 pp.
- Arizona Game and Fish Department. 2001d. California leaf-nosed bat, *Macrotus californicus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 6 pp.
- Arizona Game and Fish Department. 2002a. Banded Gila monster, *Heloderma suspectum cinctum*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 5 pp.
- Arizona Game and Fish Department. 2002b. Cave myotis, *Myotis velifer*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 6 pp.
- Arizona Game and Fish Department. 2003a. Lesser long-nosed bat, *Leptonycteris curasoae yerbabuena*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 8 pp.

---

Arizona Game and Fish Department. 2003b. Pale Townsend's big-eared bat, *Corynorhinus townsendii pallescens*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 6 pp.

Arizona Game and Fish Department. 2003c. Western yellow bat, *Lasiurus xanthinus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 6 pp.

Arizona Game and Fish Department. 2003d. Pocketed free-tailed bat, *Nyctinomops femorosaccus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 4 pp.

Arizona Game and Fish Department. 2004a. Sonoran pronghorn monthly update, December 22, 2004. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2004-12.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2004-12.pdf).

Arizona Game and Fish Department. 2004b. Sonoran pronghorn monthly update, February 26, 2004. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2004-02.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2004-02.pdf).

Arizona Game and Fish Department. 2004c. Sonoran pronghorn monthly update, April 8, 2004. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2004-04.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2004-04.pdf).

Arizona Game and Fish Department. 2004d. Sonoran pronghorn monthly update, December 22, 2004. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2004-12.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2004-12.pdf).

Arizona Game and Fish Department. 2004e. Acuña cactus, *Echinomastus erectocentrus* var. *acuñensis*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 7 pp.

Arizona Game and Fish Department. 2004f. Tumamoc globeberry, *Tumamoca macdougallii*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 6 pp.

Arizona Game and Fish Department. 2004g. Loggerhead Shrike, *Lanius ludovicianus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 5 pp.

Arizona Game and Fish Department. 2005a. Sonoran pronghorn monthly update, April 8, 2005. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2005-04.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2005-04.pdf).

Arizona Game and Fish Department. 2005b. Sonoran pronghorn monthly update, August 29, 2005. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2005-08.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2005-08.pdf).

Arizona Game and Fish Department. 2005c. Sonoran pronghorn monthly update, December 19, 2005. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2005-12.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2005-12.pdf).

- Arizona Game and Fish Department. 2005d. California barrel cactus, *Ferocactus cylindraceus* var. *cylindraceus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Arizona. 5 pp.
- Arizona Game and Fish Department. 2006a. Sonoran pronghorn monthly update, June 9, 2006. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2006-06.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2006-06.pdf).
- Arizona Game and Fish Department. 2006b. Sonoran pronghorn monthly update, January 23, 2006. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2006-01.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2006-01.pdf).
- Arizona Game and Fish Department. 2006c. Sonoran pronghorn monthly update, May 2, 2006. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2006-05.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2006-05.pdf).
- Arizona Game and Fish Department. 2006d. Sonoran pronghorn monthly update, November 27, 2006. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2006-11.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2006-11.pdf).
- Arizona Game and Fish Department. 2007a. Sonoran pronghorn monthly update, September 11, 2007. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2007-09.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2007-09.pdf).
- Arizona Game and Fish Department. 2007b. Sonoran pronghorn monthly update, January 12, 2007. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2007-01.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2007-01.pdf).
- Arizona Game and Fish Department. 2007c. Sonoran pronghorn monthly update, February 20, 2007. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2007-02.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2007-02.pdf).
- Arizona Game and Fish Department. 2007d. Sonoran pronghorn monthly update, April 30, 2007. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2007-04.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2007-04.pdf).
- Arizona Game and Fish Department. 2007e. Sonoran pronghorn monthly update, July 31, 2007. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2007-07.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2007-07.pdf).
- Arizona Game and Fish Department. 2007f. Sonoran pronghorn monthly update, September 11, 2007. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2007-09.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2007-09.pdf).
- Arizona Game and Fish Department. 2008a. Sonoran pronghorn monthly update, July 30, 2008. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2008-07.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2008-07.pdf).
- Arizona Game and Fish Department. 2008b. Sonoran pronghorn monthly update, February 28, 2008. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2008-02.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2008-02.pdf).
- Arizona Game and Fish Department. 2008c. Sonoran pronghorn monthly update, March 27, 2008. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2008-03.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2008-03.pdf).
- Arizona Game and Fish Department. 2008d. Sonoran pronghorn monthly update, June 25, 2008. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2008-06.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2008-06.pdf).
-

- Arizona Game and Fish Department. 2008e. Sonoran pronghorn monthly update, August 28, 2008. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2008-08.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2008-08.pdf).
- Arizona Game and Fish Department. 2009a. Sonoran pronghorn monthly update, January 20, 2009. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2009-01.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2009-01.pdf).
- Arizona Game and Fish Department. 2009b. Sonoran pronghorn monthly update, February 18, 2009. [http://www.azantelope.org/Sonoran\\_Pronghorn\\_Update\\_2009-02.pdf](http://www.azantelope.org/Sonoran_Pronghorn_Update_2009-02.pdf).
- Arizona Game and Fish Department. 2009c. Hunting reports, game management units 40A, 41. [http://www.azgfd.gov/h\\_f](http://www.azgfd.gov/h_f), accessed on 28 May 2009, Arizona Game and Fish Department, Phoenix, Arizona. 8 pp.
- Blue Earth Ecological Consultants, Inc. 2008. Sonoran pronghorn reestablishment internal scoping report, 18 September 2008. Prepared for the U.S. Fish and Wildlife Service, Cabeza Prieta National Wildlife Refuge. Blue Earth Ecological Consultants, Inc., Santa Fe, New Mexico. 63 pp.
- Blue Earth Ecological Consultants, Inc. 2008a. Sonoran pronghorn reestablishment scoping summary, Maricopa, Pinal, Pinal, and Yuma Counties, Arizona, 26 February 2009. Prepared for the U.S. Fish and Wildlife Service, Cabeza Prieta National Wildlife Refuge. Blue Earth Ecological Consultants, Inc., Santa Fe, New Mexico. 116 pp.
- Blue Earth Ecological Consultants, Inc. 2009b. Reestablishment of Sonoran pronghorn alternatives and impacts meeting, Ajo, Arizona, February 10-11, 2009, meeting notes. Prepared for the U.S. Fish and Wildlife Service, Cabeza Prieta National Wildlife Refuge. Blue Earth Ecological Consultants, Inc., Santa Fe, New Mexico. 35 pp.
- Boal, C. W., T. S. Estabrook, and A. E. Duerr. 2003. Productivity and breeding habitat of loggerhead shrikes in a southwestern urban environment. *The Southwestern Naturalist* 48(4): 557-562.
- Bright, J. L. and J. J. Hervert. 2005. Adult and fawn mortality of Sonoran pronghorn. *Wildlife Society Bulletin* 33(1):43-50.
- Brown, D. E. and R. A. Ockenfels. 2007. Arizona's Pronghorn Antelope, A Conservation Legacy. Arizona Antelope Foundation. 190 pp.
- Bureau of Land Management. 1988. Final Resource Management Plan/Environmental Impact Statement for the Lower Gila South RMP/EIS Area La Paz, Maricopa, Pima, Pinal, and Yuma Counties, Arizona. Phoenix District. 299 pp.
- Bureau of Land Management. 2008. Yuma Field Office Proposed Resource Management Plan and Final Environmental Impact Statement. U.S. Department of the Interior, Bureau of Land Management, Colorado River District, Yuma Field Office.

- 
- Bureau of Land Management, U.S. Fish and Wildlife Service, and Arizona Game and Fish Department. 1996. Kofa National Wildlife Refuge and Wilderness and New Waters Mountains Wilderness Interagency Management Plan, Environmental Assessment, and Decision Record. BLM/AZ/PL-97/002.
- Burkett, D. W. and B. C. Thompson. 1994. Wildlife associated with human-altered water sources in semiarid vegetation communities. *Conservation Biology* 8(3): 682-690.
- Cade, T. J. and C. P. Woods. 1997. Changes in distribution and abundance of the loggerhead shrike. *Conservation Biology* 11:21-31.
- Carr, J. N. 1981. Habitat of the Sonoran pronghorn. Pages 11-19 *in* The Sonoran Pronghorn. Special Report Number 10. Arizona Game and Fish Department, Phoenix, Arizona.
- Council on Environmental Quality. 1997. Considering Cumulative Effects Under the National Environmental Policy Act. Executive Office of the President, Council on Environmental Quality, Washington, D.C.
- Council on Environmental Quality. 2005. Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Memorandum from James L. Connaughton, Chairman, to Heads of Federal Agencies, 24 June 2005, Executive Office of the President, Council on Environmental Quality, Washington, D.C.
- DeStefano, S., S. L. Schmidt, and J. C. DeVos, Jr. 2000. Observations of predator activity at wildlife water developments in Arizona. *Journal of Range Management* 53(3): 255-258.
- deVos, J. C., Jr. 1990. Selected aspects of Sonoran pronghorn research in Arizona and Mexico. Pages 46-52 *in*: Krausman, P. R. and N. S. Smith (eds.). *Managing Wildlife in the Southwest*. Arizona Chapter of The Wildlife Society, Phoenix, Arizona.
- deVos, J. C., Jr., and W. H. Miller. 2005. Habitat use and survival of Sonoran pronghorn in years with above-average rainfall. *Wildlife Society Bulletin* 33(1): 35-42.
- Edwards, C. L. and R. D. Ohmart. 1981. Food habits of the Sonoran pronghorn. Pages 34-44 *in* The Sonoran Pronghorn. Special Report Number 10. Arizona Game and Fish Department, Phoenix, Arizona.
- ESRI, Inc. 2008. ArcGIS Media Kit, ESRI Data and Maps 9.3. Redlands, California.
- Fairbanks, S. W. and R. Tullous. 2002. Distribution of pronghorn on Antelope Island State Park, Utah, USA, before and after establishment of recreational trails. *Natural Areas Journal* 22: 277-282.
- Flora of North America Editorial Committee. 2003. Flora of North America north of Mexico, Volume 4, Magnoliophyta: Caryophyllidae, part 1. Oxford University Press, New York, Oxford. 559 pp.
- Goldman, E. A. 1945. A new pronghorn antelope from Sonora. *Proceedings of the Biological Society of Washington* 58: 3-4.

- 
- Harris Environmental Group, Inc. 1999. Sonoran pronghorn monitoring on the Barry M. Goldwater Air Force Range. Annual report, Spectrum Sciences and Software, Inc., Gila Bend and Barry M. Goldwater Range Complex, Gila Bend, Arizona.
- Hervert, J. J., J. L. Bright, L. A. Piest, M. T. Brown, and R. S. Henry. 2001. Sonoran pronghorn recovery: habitat enhancements to increase fawn survival. Proceedings of the 19th Biennial Pronghorn Antelope Workshop 19: 19-27.
- Hervert, J. J., J. L. Bright, R. S. Henry, L. A. Piest, and M. T. Brown. 2005. Home-range and habitat-use patterns of Sonoran pronghorn in Arizona. Wildlife Society Bulletin 33(1): 8-15.
- Hoffmeister, D. F. 1986. Mammals of Arizona. The University of Arizona Press and the Arizona Game and Fish Department. 602 pp.
- Hosack, D. A., P. S. Miller, J. J. Hervert, and R. C. Lacy. 2002. A population viability analysis for the endangered Sonoran pronghorn, *Antilocapra americana sonoriensis*. Mammalia 66: 207-229.
- Kearney, T. H. and R. H. Peebles. 1960. Arizona Flora. University of California Press, Berkeley, Los Angeles, London. 1085 pp.
- Krausman, P. R., J. R. Morgart, L. K. Harris, C. S. O'Brien, J. W. Cain III, and S. S. Rosenstock. 2005. Introduction: management for the survival of Sonoran pronghorn in the United States. Wildlife Society Bulletin 33(1): 5-7.
- Krausman, P. R., S. S. Rosenstock, and J. W. Cain III. 2006. Developed waters for wildlife: science, perception, values, and controversy. Wildlife Society Bulletin 34(3): 563-569.
- Maricopa County. 2009. Air Quality Department. <http://www.maricopa.gov/aq/>
- McKinney, T., D. E. Brown, and L. Allison. 2008. Winter precipitation and recruitment of pronghorns in Arizona. The Southwestern Naturalist 53(3): 319-325.
- Monson, G. 1968. The desert pronghorn. Pages 63-69 *in*: Yoakum, J., C. Hansen, N. Simmons, W. Graf, and R. Brechbil (eds.). Desert Bighorn Council 1968 Transactions, A Compilation of Papers Presented at the 12<sup>th</sup> Annual Meeting, April 10-12, 1968 at Las Vegas, Nevada. The Desert Bighorn Council Transactions, Volume 12.
- Morrison, M. L. 1981. Population trends of the loggerhead shrike in the United States. American Birds 35: 754-757.
- O'Brien, C. S., S. S. Rosenstock, J. J. Hervert, J. L. Bright, and S. R. Roe. 2005. Landscape-level models of potential habitat for Sonoran pronghorn. Wildlife Society Bulletin 33(1): 24-34.
- Otte, A. 2006. Partners save the Sonoran pronghorn. Endangered Species Bulletin 31(2): 22-23.

- 
- Paradiso, J. L. and R. M. Nowak. 1971. Taxonomic status of the Sonoran pronghorn. *Journal of Mammalogy* 52(4): 855-858.
- Parker, P. L. and T. F. King. 1998. Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Register Publications, National Register Bulletin No. 38. National Park Service, Washington, D.C. <http://www.nps.gov/nr/publications/bulletins/nrb38/nrb38%20introduction.htm#tcp>
- Phelps, J. S. 1981*a*. Biological observation on the Sonoran pronghorn. Pages 28-44 *in* The Sonoran Pronghorn. Special Report Number 10. Arizona Game and Fish Department, Phoenix, Arizona.
- Phelps, J. S. 1981*b*. Present distribution of the Sonoran pronghorn. Pages 23-27 *in* The Sonoran Pronghorn. Special Report Number 10. Arizona Game and Fish Department, Phoenix, Arizona.
- Phelps, J. S. and P. M. Webb. 1981. Historic distribution of the Sonoran pronghorn. Pages 20-22 *in* The Sonoran Pronghorn. Special Report Number 10. Arizona Game and Fish Department, Phoenix, Arizona.
- Rabe, M. J. and S. S. Rosenstock. 2005. Influence of water size and type on bat captures in the lower Sonoran desert. *Western North American Naturalist* 65(1): 87-90.
- Reed, J. M., P. D. Doerr and J. R. Walters. 1986. Determining minimum population sizes for birds and mammals. *Wildlife Society Bulletin* 14:255-261.
- Rosenstock, S. S., W. S. Ballard, and J. C. DeVos, Jr. 1999. Viewpoint: benefits and impacts of wildlife water developments. *Journal of Range Management* 52(4): 302-311.
- Rosenstock, S. S., C. S. O'Brien, R. B. Waddell, and M. J. Rabe. 2004. Studies of Wildlife Water Developments in Southwestern Arizona: Wildlife Use, Water Quality, Wildlife Diseases, Wildlife Mortalities, and Influences on Native Pollinators. Technical Guidance Bulletin No. 8, Federal Aid in Wildlife Restoration Project W-78-R, Arizona Game and Fish Department, Phoenix, Arizona. 15 pp.
- Samson, F. B., F. Perez-Trejo, H. Salwasser, L. F. Ruggiero, and M. L. Shaffer. 1985. On determining and managing minimum population size. *Wildlife Society Bulletin* 13:425-433.
- Scott, M. D. 1990. Determining a minimum genetically viable population size for Yellowstone pronghorns. *Pronghorn Antelope Workshop Proceedings* 14:26-27.
- Sibley, D. A. 2003. *The Sibley Field Guide to Birds of Western North America*. Alfred A. Knopf, New York. 471 pp.
- Simpson, D. C., L. A. Harveson, C. E. Brewer, R. E. Walser, and A. R. Sides. 2005. Influence of precipitation on pronghorn demography in Texas. *The Journal of Wildlife Management* 71(3): 906-910.

- 
- Stephen, C. L., J. C. DeVos, Jr., T. E. Lee, Jr., J. W. Bickham, J. R. Heffelfinger, and O. E. Rhodes, Jr. 2005. Population genetic analysis of Sonoran pronghorn (*Antilocapra americana sonoriensis*). *Journal of Mammalogy* 86(4): 782-792.
- Taylor, A. R. and R.L. Knight. 2003. Wildlife responses to recreation and associated visitor perceptions. *Ecological Applications* 13(4): 951-963.
- Turner, R. M. and D. E. Brown. 1994. Sonoran desertscrub. Pages 181-221 *in* Brown, D. E. (ed.). *Biotic communities, southwestern United States and northwestern Mexico*. University of Utah Press, Salt Lake City. 342 pp.
- U.S. Air Force. 2000. Environmental assessment, Sonoran pronghorn forage enhancement. Luke Air Force Base, Arizona. 107 pp.
- U.S. Air Force. 2008. Preliminary draft Environmental Impact Statement for Barry M. Goldwater Range Enhancements. 56th Fighter Wing, Range Management Office, Luke Air Force Base, Arizona.
- U.S. Air Force. 2009. BMGR - Overview Fact Sheet. Luke Air Force Base web site. <http://www.luke.af.mil/library/factsheets>
- U.S. Army. 2009. Yuma Proving Ground web site, <http://www.yuma.army.mil>.
- U.S. Census Bureau. 2009a. *American Fact Finder, GCT-T1-R*. Population Estimates; Data Set: 2007 Population Estimates: Arizona-County. <http://factfinder/census.gov/>
- U.S. Census Bureau. 2008b. *American Fact Finder, P1*. Total population [1] - universe: total population; data set: Census 2000 summary file 1(SF 1) 100-percent data.. <http://factfinder/census.gov/>
- U.S. Census Bureau. 2008c. *American Fact Finder, P7*. Race [8] - universe: total population; data set: Census 2000 summary file 1(SF 1) 100-percent data.. <http://factfinder/census.gov/>
- U.S. Census Bureau. 2008d. *American Fact Finder, P8*. Hispanic or Latino by race [17] - universe: total population; data set: Census 2000 summary file 1(SF 1) 100-percent data.. <http://factfinder/census.gov/>
- U.S. Census Bureau. 2007e. *American Fact Finder, P82*. Per capita income in 1999 (dollar) [1] - universe: total population; data set: Census 2000 summary file 3 (SF 3) - sample data. <http://factfinder.census.gov/>
- U.S. Census Bureau. 2007f. *American Fact Finder, P87*. Poverty status in 1999 by age [17] - universe: population for whom poverty status is determined; data set: Census 2000 summary file 3 (SF 3) - sample data. <http://factfinder.census.gov/>
- U.S. Fish and Wildlife Service. 1998. Final Revised Sonoran Pronghorn Recovery Plan. Albuquerque, New Mexico. 70 pp.

- 
- U.S. Fish and Wildlife Service. 2001. Biological opinion for proposed military training administered by the U.S. Air Force on the Barry M. Goldwater Range, consultation no. 2-21-96-F-094-R1, 16 November 2001. U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, New Mexico. 78 pp.
- U.S. Fish and Wildlife Service. 2003a. Supplement and amendment to the 1998 final revised Sonoran pronghorn recovery plan (*Antilocapra americana sonoriensis*). U.S. Department of the Interior, Fish and Wildlife Service, Albuquerque, New Mexico. i-iv + 60 pp., A1-3, B1-30, C1-8.
- U.S. Fish and Wildlife Service. 2003b. Biological and conference opinion for the Organ Pipe Cactus National Monument General Management Plan, consultation no. 02-21-89-F-078R1, 7 April 2003. U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona. 81 pp.
- U.S. Fish and Wildlife Service. 2003c. Biological opinion for proposed military training administered by the U.S. Air Force on the Barry M. Goldwater Range, consultation no. 2-21-96-F-094-R2, 6 August 2003. U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona. 87 pp.
- U.S. Fish and Wildlife Service. 2005. Reinitiation of formal consultation and conferencing - General Management Plan and North Puerto Blanco Drive, Organ Pipe Cactus National Monument, consultation nos. 2-21-89-F-0078-R3 and 2-21-01-F-0109-R2, 10 March 2005. U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, Phoenix, Arizona. 7 pp.
- U.S. Fish and Wildlife Service. 2006. Cabeza Prieta National Wildlife Refuge Comprehensive Conservation Plan, Wilderness Stewardship Plan, and Environmental Impact Statement. U.S. Fish and Wildlife Service, Division of Planning, National Wildlife Refuge System, Southwest Region, Albuquerque, New Mexico. 242 pp.
- Western Regional Climate Center. 2009. Arizona climate summaries. <http://www.wrcc.dri.edu/summary/climsmaz.html>, accessed on 21 May 2009.
- Wilson, R. R., P. R. Krausman, and J. R. Morgart. 2008. Behavior and timing of life-history events in a semi-captive population of Sonoran pronghorn (*Antilocapra americana sonoriensis*). *The Southwestern Naturalist* 53(3): 389-393.
- Woods, C. P. and T. J. Cade. 1996. Nesting habits of the loggerhead shrike in sagebrush. *Condor* 98:75-81.