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AESO/SE
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July 24, 2003

Memorandum

To: Superintendent, Organ Pipe Cactus National Monument, Ajo, Arizona

From: Field Supervisor

Subject: Biological and Conference Opinion for the International Boundary Vehicle Barrier on the Organ Pipe Cactus National Monument

This memorandum transmits the U.S. Fish and Wildlife Service's (FWS) biological opinion based on our review of the proposed International Boundary Vehicle Barrier on the National Park Service's (NPS) Organ Pipe Cactus National Monument (NM), located in Pima County, Arizona, and its effects on the Sonoran pronghorn (*Antilocapra americana sonoriensis*, pronghorn), lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*, bat), Quitobaquito pupfish (*Cyprinodon eremus*) and cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*, pygmy-owl), in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq., ESA).

This biological opinion is based on information provided in the Biological Assessment you provided in April, 2003, updated information on the proposed action provided by your agency, telephone conversations, field investigations, and other sources of information as detailed in the consultation history. A complete administrative record of this consultation is on file at the Phoenix, Arizona, Ecological Services Field Office (AESO).

The memorandum that we received from you (dated June 17, 2003) documented your determinations:

- Sonoran pronghorn—May affect, likely to adversely affect.
- Lesser long-nosed bat—May affect, likely to adversely affect.
- Quitobaquito pupfish—May affect, not likely to adversely affect.
- Quitobaquito pupfish critical habitat—May affect, not likely to adversely affect.
- Cactus ferruginous pygmy-owl—May affect, likely to adversely affect.

- Cactus ferruginous pygmy-owl proposed critical habitat—may affect, likely to adversely affect.

In that memorandum you requested formal consultation for the Sonoran pronghorn, lesser long-nosed bat, and cactus ferruginous pygmy-owl; formal conferencing on the proposed critical habitat of the cactus ferruginous pygmy-owl; and concurrence with your determinations for the Quitobaquito pupfish and its critical habitat. We concur with all of the determinations. The main body of this biological opinion will address formal consultation for the Sonoran pronghorn, lesser long-nosed bat, and cactus ferruginous pygmy-owl; and formal conferencing on the proposed critical habitat of the cactus ferruginous pygmy-owl. Concurrence for the Quitobaquito pupfish and its critical habitat is addressed in the Appendix.

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CONSULTATION HISTORY

- January 7, 2003: An e-mail was sent to us from NPS notifying us that a request for consultation would be sent to us for this project, and asking for a primary contact.
- March 12, 2003: We received from NPS the biological assessment and request to initiate formal consultation.
- April 29, 2003: Staff from our agencies discussed timelines, changes in the proposed action, and impacts to listed species from implementing the proposed action.
- May 30, 2003: We sent NPS a memorandum requesting further information and clarification of the proposed action, mitigations, analyses and determinations.
- June 6, 2003: We received a memorandum from NPS acknowledging the receipt of our May 30, 2003, memorandum.
- June 16, 2003: We received from NPS the ‘Restoration Plan for the Proposed Vehicle Barrier along the International Boundary, Organ Pipe Cactus National Monument’ April 2003.
- June 18, 2003: We received from NPS another reply to our May 30, 2003, request.
- July 10, 2003: NPS emailed their proposed conservation measures for the pygmy-owl and staff discussions ensued.
- July 17, 2003: A draft biological opinion was signed and sent via mail and email to NPS.
- July 21, 2003: NPS comments on the draft biological opinion were received in this office.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The NPS proposes to construct a vehicle barrier along those portions of the US-Mexico border in the Organ Pipe Cactus NM where the terrain allows illegal vehicle crossing. This represents a total of about 30 miles (48 km) of barrier, which traverses virtually the entire international border at Organ Pipe Cactus NM. The barrier will consist of a railroad rail horizontal cross piece 3 feet (0.9 m) high, anchored to uprights every 5 feet (1.5 m). The uprights will be built of railroad rail and/or concrete-filled steel posts. Where terrain or subsurface conditions make post construction difficult, a steel-girder barrier without a foundation (“Normady barrier”) will be placed on the ground surface.

The intent of the structure is to prevent damage to natural and cultural resources, and to increase the safety of patrol officers who work along the border (NPS, Border Patrol, local law enforcement, etc.), as well as the safety of other staff and the general public.

Vehicle crossings by drug smugglers, illegal aliens, or illegal alien smugglers have destroyed and are destroying vegetation, compromising designated wilderness, degrading habitat for

endangered species, damaging cultural and archaeological sites, and causing other resource impacts. Natural resources have been severely impacted by these incursions. Illegal transport of drugs and people into the United States by vehicle has created over 149 miles (240 km) of illegal vehicle roads through designated wilderness areas in the past 24 months (Figure 1). Because of the extensive network of illegal roads, usually in remote locations, the NPS has not been able to inventory and map all illegal roads, including the extensive lesser trackways where vehicles have driven cross-country only one to several times over a given route. In addition to creating new, illegal roads, smugglers and illegal immigrants also use “official” backcountry roads. Illicit traffic is causing severe damage to these roads and adjacent areas, because the roads are not suitable for the large volumes of traffic they are currently bearing.

Vehicle pursuit by law enforcement personnel is a routine occurrence and is the single most dangerous activity along the border at this time. The proposed barrier will eliminate or greatly reduce such incursions across the border and into the Organ Pipe Cactus NM wilderness backcountry. The barrier would also eliminate the most-used escape route for fleeing vehicles returning to Mexico (the unhardened border), thereby greatly reducing the probability that flight will lead to escape. This will in turn greatly reduce the number of vehicle pursuits.

Area Disturbed

Organ Pipe Cactus NM lies in southwestern Arizona. It is located along the international border with Mexico, in western Pima County, south of the town of Ajo. Organ Pipe Cactus NM is comprised of approximately 330,689 acres of Sonoran Desert plains, bajadas, and rugged mountains. Its “sister” park, El Pinacate Reserva de la Biosfera, is nearby to the southwest. The city of Sonoyta, Sonora, lies immediately south of Organ Pipe Cactus NM and the Port Of Entry of Lukeville, Arizona.

The proposed project area is the approximately 30-mile length of Organ Pipe Cactus NM’s southern boundary, the international border with the Republic of Mexico (Figures 1 and 2). This border extends from the Sierra de Santa Rosa in Organ Pipe Cactus NM’s southeastern corner, northwestward to the boundary between Organ Pipe Cactus NM and Cabeza Prieta National Wildlife Refuge. The primary area of project disturbance will be approximately 30 feet (9.15 m) wide and approximately 30 miles (48.25 km) long. The vehicle barrier will consist of two major segments (Figure 2). One segment will extend from the steep western slopes of the Sierra de Santa Rosa (southeastern corner of Organ Pipe Cactus NM), northwestward to the steep eastern slopes of “Monument Hill” in the Sonoyta Mountains, about 1.5 mile west of the Lukeville Port Of Entry. This segment will be approximately 12.9 miles in length, interrupted only by the Port of Entry. The second segment, approximately 14.7 miles in length, will extend from the western slopes of “Monument Hill” in the Sonoyta Mountains, northwestward to Organ Pipe Cactus NM’s southwestern corner. This segment will be contiguous for its entire length.

In addition to the primary project corridor, there will also be 35 staging areas and 2 turn-around sites for vehicle turn-around and materials storage (Figure 2). In most cases, these staging areas will extend approximately 30 feet (9.15 m) beyond the primary 30 feet (9.15 m) disturbance strip.

These staging areas will vary considerably in length, from approximately 100 to 250 feet. West of Monument Hill in the Sonoyta Mountains, staging areas will also incorporate the South Puerto Blanco Drive, widened by 5 ft for up to 300 ft. Within this overall project footprint, substantial areas are already disturbed, primarily in the form of the existing border fence access road. This road, within the primary 30-ft project corridor, will be used as the primary project work access avenue. It will be retained as a road approximately 12 ft wide after the project. The project will result in a net disturbance of approximately 70.3 new acres.

Construction Methods

The barrier will consist of a horizontal railroad rail cross piece set 3 feet high, welded to uprights every 5 feet. The uprights will be built of railroad rail and/or concrete-filled steel posts. The uprights will be anchored in holes drilled to 5-foot depth, then filled with 3 ft of concrete. The remaining 2 ft of depth will be backfilled with the excavated soil and gravel. Uprights will alternate between 5 and 6 ft above ground.

In some areas, the existing barbed-wire boundary fence will be left in place, approximately 1-2 ft south of the new vehicle barrier. In other areas, the existing barbed-wire boundary fence will be removed. In those areas where livestock are present in adjacent Mexico, one strand of barbed wire will be placed above the horizontal member of the vehicle barrier, and one strand of smooth wire will be placed no less than 18" above ground, below the horizontal member. At this time, it has not been determined where the existing barbed-wire fence will be retained or removed.

Where terrain or subsurface conditions make it difficult or impossible to drill holes for the post uprights, a steel-girder barrier without a foundation ("Normady barrier") will be placed on the ground surface. These barriers will be used on the steep slopes of the Sierra de Santa Rosa, and "Monument Hill" just west of Lukeville in the Sonoyta Mts. A Normandy Barrier will also be placed across the drainage at the north end of "Monument Hill," to prevent further use of this route for illegal traffic.

For most of its length, the vehicle barrier will be constructed approximately three feet north of the international border. For a length of 0.75 to 1.0 mile just east of Gray Ranch (a.k.a. Dos Lomitas or Blankenship Ranch), the barrier will be constructed 10 to 15 feet north of the boundary (Figure 2).

The vehicle barrier will be similar in appearance to the one pictured in Figure 3. Differences will be that the Organ Pipe Cactus NM vehicle barrier will be constructed of railroad rail, not the steel girders pictured on this barrier near Naco, Arizona. Also, the horizontal member of the Organ Pipe Cactus NM barrier will be set at 3 ft above ground, which is higher than pictured here. Finally, all vertical members will extend into the ground.

Construction Schedule:

Construction may begin between September and October 2003. Construction would take place over approximately a two-year time-frame in three phases (refer to Figure 2):

- Phase 1: Construction from October 2003 to approximately March 2004, from Sonoyta Hills (aka Monument Hill) at KM 20.8 East, eastward to the area of Blankenship Ranch (KM 10.5 east).
- Phase 2: Phase 2 construction will take place from the monument's southeastern corner (KM 0.0 east) to the eastern end of Phase 1 construction - the area of Blankenship Ranch (KM 10.5 east). NPS currently estimates that Phase 2 construction would begin no sooner than July 30, 2004.
- Phase 3: Phase 3 construction will extend from the monument's southwestern corner (KM 23.3 west) to the western slope of Monument Hill (KM 0.0 west). NPS currently estimates that Phase 3 construction would begin in mid-2005.

Maintenance:

The barrier and road will be maintained throughout the life of the project (more than 10 years). The barrier will be maintained (repaired) if necessary using welding and other equipment. The access road will be maintained using heavy equipment when necessary. All of these activities could occur at any time of the year depending on need.

Conservation Measures

The 'Restoration plan for the proposed vehicle barrier along the international boundary, Organ Pipe Cactus National Monument' (NPS 2003) is incorporated as part of the proposed action.

1. NPS will salvage some vegetation and collect seed, and rehabilitate most staging areas and access roads not being permanently maintained for barrier access. NPS will salvage all saguaro, senita, and organ pipe cactus up to 1 meter (about 3 feet) tall. NPS will attempt to salvage saguaros up to six feet tall. NPS estimates that 400-600 cacti will be salvaged.
2. NPS will survey for and control invasive plants in the project area.

The following measures have been or will be implemented as part of the proposed action to minimize adverse effects to the pronghorn:

1. NPS will, in coordination with the pronghorn recovery team, place temporary water sources in key areas, primarily during the dry season, and including a monitoring program to assess effectiveness of temporary waters.
2. NPS will continue participation in, and financial support of, the pronghorn emergency recovery projects, in coordination with the pronghorn recovery team.
3. NPS will provide an annual report of pronghorn conservation efforts addressing annual progress for each of the measures listed here and in other current biological opinions on the pronghorn, due January 31 of each year.

4. NPS will contribute to the 51 recovery projects identified by the pronghorn recovery team within NPS regulations, either by providing in-kind contributions or by commitment of funds.

The following measures have been or will be implemented as part of the proposed action to minimize adverse effects to the lesser long-nosed bat:

1. NPS will continue to monitor the Copper Mountain roost to determine the presence and abundance of, and disturbance to, lesser long-nosed bats, including examining the roost year-round for evidence of human entry.
2. If unauthorized entry into the Copper Mountain roost is discovered, NPS will take immediate action to prevent further disturbance to the roost, and will install additional exclusion devices as appropriate.
3. NPS will continue to monitor the Victoria Mine complex roost.
4. NPS will, as funding permits, continue to investigate mines on Organ Pipe Cactus NM, identifying those that may provide roost sites, and enlarging openings in potential roost sites to facilitate entry of bats. The investigation will include those mines identified as bat roosts by the AGFD Natural Heritage Program. A report of this effort will be incorporated into Organ Pipe Cactus NM's annual summary of threatened and endangered species activities.

The following measures have been or will be implemented as part of the proposed action to minimize adverse effects to the pygmy-owl:

1. For construction of Phase 1--Construction in areas of suitable pygmy-owl habitat (e.g., between Lukeville and Monument Hill) will take place outside the breeding season (breeding season is February 1 to July 31).
2. If activities may occur in high and moderate quality habitat during the breeding season (February 1 to July 31) during Phase 2 or Phase 3, NPS will conduct surveys in, and within 400 meters of, high and moderate quality habitat in the project area of those Phases prior to the onset of construction activities.
 - a. **Phase 2:** NPS will complete intensive 'one-year' pygmy-owl surveys during the survey season of 2004 (January 1 to June 30). NPS will conduct a total of six visits, with four of these visits conducted between February 15 and April 15. The visits will be spaced at least 15 days apart.
 - b. **Phase 3:** NPS will complete the two-year survey protocol for project clearance as presented in 'Cactus Ferruginous Pygmy-owl Survey Protocol', January 2000.
3. If owls are detected either through surveys or incidentally in or near the project area, activities will not occur within 400 meters of the nesting area (if it can be determined) or detection site during the breeding season.

4. NPS and we will coordinate in determining if some areas of suitable habitat may be impacted during the breeding season without surveys depending on the existing level of disturbance that may already be occurring in specific areas.
5. NPS will conduct maintenance activities outside the breeding season (February 1 to July 31) in suitable habitat. If this is not possible because of law enforcement requirements, then maintenance activities during the breeding season in suitable habitat will be conducted from three hours after sunrise to two hours before sunset to avoid the most active times for pygmy-owls.
6. NPS will use its authorities to implement, as funding permits, a new program specifically to develop inventory and monitoring information on Organ Pipe Cactus NM about the pygmy-owl.
7. NPS will mutually develop with U.S. Border Patrol (Border Patrol) a comprehensive plan to manage human activity in backcountry areas associated with illegal traffic and associated law enforcement activities. The plan will include management actions specific to all listed species that occur on Organ Pipe Cactus NM, and will contain measures that specifically address minimization of noise and human activities near pygmy-owl nest sites and known areas of pygmy-owl occurrence such as the Armenta Southeast, Boundary Site, Kuakatch, Growler, and Arch survey areas. The plan will be developed as soon as feasible, provided cooperation from the Border Patrol on the plan can be obtained. Once completed, NPS will provide us a copy of the plan, and will continue ongoing dialogs with the Border Patrol on both resource management and law enforcement issues and sharing of information. NPS will continue to provide Border Patrol agents with training on resource management policies and protection, including those relevant to threatened and endangered species. NPS will continue to monitor, document, and mitigate the impacts of undocumented aliens and smugglers on the natural resources of the Monument.
8. NPS will use its authorities to acquire and add to the Monument the section of state lands containing Growler Canyon (R7W, T14S, Section 36, Bates Well Quad).

SONORAN PRONGHORN (*Antilocapra americana sonoriensis*)

STATUS OF THE SPECIES

A. Description, Legal Status, and Recovery Planning

The Sonoran subspecies of pronghorn (*Antilocapra americana sonoriensis*) was first described by Goldman (1945) from a type specimen taken near the Costa Rica Ranch, Sonora, Mexico by Vernon Bailey and Frederic Winthrop on December 11, 1932, and is currently recognized as one of five subspecies of pronghorn (Nowak and Paradiso 1983). Recent molecular genetic analysis of the Sonoran pronghorn and other subspecies of the American pronghorn did not provide a clear genetic basis for designation of the Sonoran pronghorn as a distinct subspecies (Rhodes *et al.* 2003). However, the analysis showed a clear genetic differentiation of the Sonoran pronghorn

from pronghorn populations in central and eastern Arizona. The authors found that any evaluation of the taxonomy of the Sonoran pronghorn should not only evaluate genetic information, but should also rely on extensive morphological and ecological analyses; which to date have not been completed.

The Sonoran pronghorn is the smallest subspecies of *Antilocapra americana*. The subspecies was listed throughout its range as endangered on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of October 15, 1966. Three sub-populations of the Sonoran pronghorn are extant: 1) a U.S. sub-population in southwestern Arizona, 2) a sub-population in the Pinacate Region of northwestern Sonora, and 3) a sub-population on the Gulf of California west and north of Caborca, Sonora. The three sub-populations are geographically isolated due to barriers such as roads and fences, and in the case of the two Sonora sub-populations, by distance. Critical habitat has not been designated for the pronghorn.

The 1982 Sonoran Pronghorn Recovery Plan (U.S. Fish and Wildlife Service 1982) was revised in 1998 (U.S. Fish and Wildlife Service 1998a). The recovery criteria presented in the revised plan entailed the establishment of a population of 300 adult pronghorn in one self-sustaining population for a minimum of five years, as well as the establishment of at least one other self-sustaining population in the U.S. to reclassify the subspecies to threatened.

Actions identified as necessary to achieve these goals include the following: 1) enhance present sub-populations of pronghorn by providing supplemental forage and/or water; 2) determine habitat needs and protect present range; 3) investigate and address potential barriers to expansion of presently used range and investigate, evaluate, and prioritize present and potential future reintroduction sites within historical range; 4) establish and monitor a new, separate herd(s) to guard against catastrophes decimating the core population, and investigate captive breeding; 5) continue monitoring sub-populations and maintain a protocol for a repeatable and comparable survey technique; and 6) examine additional specimen evidence available to assist in verification of taxonomic status.

In February 2001, the D.C. Federal District Court ordered the Fish and Wildlife Service to reassess Sonoran pronghorn recovery criteria and to provide estimates of time required to perform recovery actions detailed in the 1998 plan. In response, a supplement and amendment to the 1998 Final Revised Sonoran Pronghorn Recovery Plan was prepared (U.S. Fish and Wildlife Service 2001). We concluded that, given the nature of the current threats, unknown elements of pronghorn life history and habitat requirements, uncertainty of availability of suitable reintroduction sites and animals for transplants, internal and external resistance to pro-active management actions on wilderness and other areas of public lands, and continuing uncertainty regarding the long-term stability and status of sub-populations in Mexico, the data do not yet exist to support establishing delisting criteria. Tasks necessary to accomplish reclassification to threatened status (as outlined in the 1998 plan) should provide the information necessary to determine if and when delisting will be possible and what the criteria should be.

B. Life History

Sonoran pronghorn inhabit one of the hottest and driest portions of the Sonoran Desert. They forage on a large variety of perennial and annual plant species (Hughes and Smith 1990, Hervert *et al.* 1997b, U.S. Fish and Wildlife Service 1998a), and will move in response to spatial limitations in forage availability (Hervert *et al.* 1997a). Although it is theoretically possible for pronghorn to meet water requirements through forage consumption (Fox *et al.* 1997), after subtracting water required for excretion, respiration, and evaporation (approximately 50 percent), predicted water intake from forage was not adequate to meet minimum water requirements for 14 of 20 simulated diets (Fox *et al.* 2000). Sonoran pronghorn will drink surface water if it is available (U.S. Fish and Wildlife Service 1998a).

Pronghorn consume a wide variety of plants. Fecal analysis indicated Sonoran pronghorn consume 69 percent forbs, 22 percent shrubs, 7 percent cacti, and 0.4 percent grasses (U.S. Fish and Wildlife Service 1998a). During drought years, Hughes and Smith (1990) reported cacti were the major dietary component (44 percent). Consumption of cacti, especially chain fruit cholla (*Cylindropuntia fulgida*, Pinkava 1999), provides a source of water during hot, dry conditions (Hervert *et al.* 1997b). Other important plant species in the diet of the pronghorn include pigweed (*Amaranthus palmeri*), ragweed (*Ambrosia* sp.), locoweed (*Astragalus* sp.), brome (*Bromus* sp.), and snakeweed (*Gutierrezia sarothrae*) (U.S. Fish and Wildlife Service 1998a).

Sonoran pronghorn rut during July-September, and does have been observed with newborn fawns from February through May. Parturition corresponds with annual spring forage abundance. Fawning areas have been documented in the Mohawk Dunes and the bajadas of the Sierra Pinta, Mohawk, Bates, Growler, and Puerto Blanco mountains. Does usually have twins, and fawns suckle for about 2 months. Does gather with fawns, and fawns sometimes form nursery groups (U.S. Fish and Wildlife Service 1998a). Hughes and Smith (1990) recorded an average group size of 2.5 animals; however, group size observed by Wright and deVos (1986) averaged 5.1, with the largest group containing 21 animals. Group size likely varies with population size. At that time the U.S. sub-population was roughly about 100 animals (Arizona Game and Fish Department 1981, 1986).

The results of telemetry studies in 1983-1991 indicated that Sonoran pronghorns non-randomly use their habitats (deVos 1998). Pronghorn move from north to south or northwest to southeast, and upslope as summer progresses. Movements are most likely motivated by the need for thermal cover provided by leguminous trees and water available in succulent cacti such as chain fruit cholla (Hervert *et al.* 1997b), that are more abundant on bajadas and in the southern portion of the pronghorn's range. Home range size of Sonoran pronghorn ranged from 24.9 to 468 mi² for males and from 15.7 to 441 mi² for females (Wright and deVos 1986).

Causes of pronghorn mortality are often difficult to determine; however, some radio-collared Sonoran pronghorn have been killed by coyotes, mountain lions, and bobcats. Some of these

mortalities may have been influenced by dry periods, which predisposed pronghorn to predation (U.S. Fish and Wildlife Service 1998a). Hervert *et al.* (2000) found that the number of fawns surviving until the first summer rains was significantly correlated to the amount of preceding winter rainfall, and negatively correlated to the number of days without rain between the last winter rain and the first summer rain. Three radio-collared pronghorn died in July and August of 2002 with no obvious cause of death. Given that 2002 was one of the driest years on record, the proximate cause of these mortalities was likely heat stress and/or malnutrition resulting from inadequate forage conditions due to drought (J. Hervert, Arizona Game and Fish Department, pers. comm. 2002).

C. Habitat

Turner and Brown (1982) described seven subdivisions of Sonoran Desert scrub, two of which encompass the habitat of Sonoran pronghorn in the U.S. and the Pinacate Region of Sonora (Felger 2000). These are the Lower Colorado River Valley and the Arizona Upland subdivisions. Creosote (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) are dominant perennials of the Lower Colorado River Valley subdivision. Plant species along major water courses include ironwood (*Olneya tesota*), blue palo verde (*Parkinsonia floridum*), and mesquite (*Prosopis velutina* and *P. glandulosa*). Species in the Arizona Upland include foothill palo verde (*Parkinsonia microphyllum*), catclaw acacia (*Acacia greggii*), chain fruit cholla, teddy bear cholla (*Cylindropuntia bigelovii*), buckhorn cholla (*C. acanthocarpa*), and staghorn cholla (*C. versicolor*).

The habitat of the pronghorn in the U.S. consists of broad alluvial valleys separated by block-faulted mountain and surface volcanics. In December 1984, 40 percent of the pronghorn observed during a telemetry flight were in the Growler Valley, from the Aguila Mountains to the International Border. Arizona Game and Fish Department (1985) reported that pronghorn use flat valleys and isolated hills to a greater degree than other topographic features.

Drainages and bajadas are used by pronghorn during spring and summer. Washes flow briefly after rains during the monsoon season and after sustained winter rains. The network created by these washes provides important thermal cover (shade) for pronghorn during the hot summer season. Bajadas are used as fawning areas in the spring. Pronghorn were observed using palo verde, ironwood, and mesquite for cover during weekly Arizona Game and Fish Department telemetry flights, which began in 1994 (Hervert *et al.* 1997b). Pronghorn were observed in playas in April and May of 1988 and 1989 when forbs were abundant, later vacating these areas when desiccation of annuals occurred (Hughes and Smith 1990). In years with sufficient winter and spring precipitation, some playas produce abundant annual plant growth.

Some of the sandy areas within pronghorn habitat such as Pinta Sands, the Mohawk Dunes west of the Mohawk Mountains, and the west side of the Aguila Mountains, provide a greater variety

of seasonal vegetation when precipitation events occur. The openness of these areas appears to be attractive for pronghorn as the annuals, grasses, and shrubs provide good forage, particularly in the spring. These areas have long been considered significant pronghorn habitat in the U.S. Carr (1974) reported seeing pronghorn frequently in the Pinta Sands area. Due to the more arid nature of valley and dune habitats, annuals dry and cure, with decreased palatability for pronghorns as summer approaches. Also, these habitats lack sufficient woody vegetation to satisfy pronghorn requirements for nutrition and thermal protection. These factors limit the temporal suitability of these areas and most pronghorn move to bajadas and washes in the southeastern portion of the range by early summer.

D. Distribution and Abundance

United States

Prior to the identification of the subspecies known as the Sonoran pronghorn (Goldman 1945), specimens of pronghorn taken within its range were identified as other subspecies (Arizona Game and Fish Department 1981). Historically, the Sonoran pronghorn ranged in the U.S. from approximately the Santa Cruz River in the east, to the Gila Bend and Kofa Mountains to the north, and to Imperial Valley, California, to the west (Mearns 1907, Nelson 1925, Monson 1968, Wright and deVos 1986, Paradiso and Nowak 1971; Figure 4).

During an international boundary survey conducted from 1892 through 1894, pronghorn were found in every open valley along the international boundary from Nogales, Mexico to Yuma, Arizona (Carr 1971). In 1893, Mearns (1907) reported seeing a herd of 12 pronghorn near border monument 143 in the Baboquivari Valley and small numbers in the Santa Rosa Valley near monument 161 on what is now the Tohono O'odham Nation. Nelson (1925) stated that in 1923, local people reported that a few pronghorn were still ranging in the Santa Rosa Valley. Carr (1970) noted the "sighting of eight antelope near Pisinimo on the "Papago Indian Reservation" (Tohono O'odham Nation) which most likely drifted north from Mexico," and that "there have been numerous rumors of antelope in the Papago country"; however, no recent reliable observations are known. Carr (1970) also stated that there "is a considerable amount of good Sonoran antelope habitat on the Papago Indian Reservation and particularly in the Great Plains area. However, Indian hunting and grazing practices prohibit a lasting resident antelope population." Fencing on rangelands probably also created barriers to pronghorn movement on the Reservation and elsewhere. In 1894, pronghorn were abundant near monuments 178 and 179, and westward to Tule Well (Mearns 1907). In February 1894, Mearns observed them in the Lechuguilla Desert, as well. In the Colorado Desert (presumably west of the Gila and Tinajas Altas mountains), Mearns (1907) reported that pronghorn were not abundant. He observed pronghorn tracks in California at Gardner's Laguna, 6 miles south of monument 216, and 37 miles west of the Colorado River; and then again at Laguna Station, 7 miles north of monument 224 and 65 miles west of the Colorado River.

While Mearns (1907) suggested that pronghorn may have been common in some areas in the late 1800s, evidence suggests that the sub-population declined dramatically in the early 20th century. Sub-population estimates for Arizona, which only began in 1925, have never shown the pronghorn to be abundant (Table 1).

Repeatable, systematic surveys were not conducted in Arizona until 1992. Since 1992, Sonoran pronghorn in the United States have been surveyed biennially (Bright *et al.* 1999, 2001) using aerial line transects (Johnson *et al.* 1991). Sub-population estimates from these transects have been derived using three different estimators (Table 2); currently the sightability model (Samuel and Pollock 1981) is considered the most reliable estimator (Bright *et al.* 1999, 2001). Table 2 presents observation data from transects and compares estimates derived from the three population models from 1992 through 2002.

Bright *et al.* (2001) defined the present U.S. range of the Sonoran pronghorn as bordered by Interstate 8 to the north, the International Border to the south, the Copper and Cabeza mountains to the west, and SR 85 to the east (see Figures 4 and 5). This area encompasses 2,508 mi² (Bright *et al.* 2001). Based on pronghorn location records from 1994-2001 (Figure 5), locations of pronghorn from 1983-1995, and observations by Carr (1972) and Hall (1981), pronghorn are believed to have occurred most frequently in the recent past in the following areas: Pinta Sands, Growler Valley, Mohawk Valley, San Cristobal Valley, and between the Growler and Little Ajo Mountains (Daniel's Arroyo area). Wright and deVos (1986) stated that observations in the Growler Valley were frequent and that the Mohawk Valley, San Cristobal Valley, and BMGR supported herds of 10 to 20 animals during most of the year. Also mentioned was a regularly observed herd of 7 to 10 pronghorn in the Cameron tank area on BLM lands near Ajo.

Occasional sightings of pronghorn are recorded outside of the range defined by telemetry locations in Figure 5. For instance, a possible pronghorn sighting occurred east of Aztec and north of Interstate 8 in 1990 (U.S. Fish and Wildlife Service 1998a). Two adult pronghorn were observed in 1990 (U.S. Fish and Wildlife Service 1998a) in the northern San Cristobal Valley approximately 5 miles southeast of Mohawk Pass in the Mohawk Mountains. In 1987, a Border Patrol agent reported a pronghorn on the Tohono O'odham Nation; this sighting was not confirmed.

Although observations of pronghorn were common along and east of SR 85 many years ago, observations east of SR 85 in recent years have been very rare. The paucity of recent observations east of the highway indicates that this heavily-used road currently poses a barrier to eastward movement. On June 12, 1996, however, an adult doe pronghorn was observed running west off the right-of-way at the approach of a vehicle on the north end of the Crater Range (R. Barry, Luke AFB, pers. comm. 1996). There also exists an unconfirmed report of four Sonoran pronghorn attempting to cross SR 85 in August 1993 approximately one mile north of the Organ Pipe Cactus NM visitor center. A juvenile crossed the highway (two lanes) to the east, but with the approach of a vehicle, ran back across the road to rejoin a group of three pronghorn (T. Ramon, Organ Pipe Cactus NM, pers. comm. 1993). In July 2002, a radio-collared pronghorn crossed SR 85 and continued on to the base of the Ajo Mountains where it later died in August 2002. In September 2002, a second radio-collared pronghorn crossed SR 85. This animal spent most of its time in the vicinity of Ajo Mountain Scenic Loop road, just off the southwestern end

of the Diablo Mountains. After 8 days, she crossed back to the west side of Highway 85, and moved to a locally green area in the Growler Valley west of the monument. These seemingly aberrant movement patterns were likely the result of nutritional stress brought on by the 2002 drought, discussed further below. On July 3, 2003, a pronghorn was again observed crossing SR 85 just north of the Organ Pipe Cactus NM's Visitor Center (D. Hutson, Organ Pipe Cactus NM, pers. comm. 2003).

In recent years, the Tohono O'odham Nation has not been accessible to state and Federal biologists to survey for Sonoran pronghorn. A Border Patrol agent reported a pronghorn on the Nation lands in 1987 (U.S. Fish and Wildlife Service 1998a), and although unconfirmed, this is the last report of Sonoran pronghorn on the Nation. There are no recent records of pronghorn south of the Nation in Sonora. Carr (1970) reported that hunting and grazing on the Nation was not compatible with maintaining a viable population of pronghorn. Phelps (1981) reported that pronghorn had not been observed on the Nation for 10 years. These observations suggest that pronghorn are likely extirpated from the Nation and adjacent areas.

The sightability model population estimates from 1992 to 2000 showed a 45 percent decrease in sub-population size (Table 2). The estimates indicate a steady decline in sub-population size, with the exception of the 1994 survey. The 1994 estimate may be somewhat inflated due to inconsistencies in survey timing (U.S. Fish and Wildlife Service 1998a, Bright *et al.* 2001). The 1994 survey occurred in March (whereas those of other years occurred in December) and therefore the number may be slightly inflated because of the sightability of pronghorn at this time of year (J. Morgart, FWS, pers. comm. 2001). Different population models may result in divergent estimates. Therefore, the inclusion of estimates obtained prior to 1992 in the analysis of population trends is not reasonable.

Some researchers believe that the number of pronghorn observed on transects is more statistically valid for the evaluation of population trends than estimates generated by population models (Johnson *et al.* 1991, Hervert *et al.* 1997a). For instance, the number of pronghorn observed on transects decreased by 32 percent from 1992 to 2000 (Table 2). Contrary to the sightability model estimate, the number of pronghorn observed on transects showed a minor increase, while the total number of pronghorn sighted actually decreased in 1994 compared to the 1992 survey. Sightability model estimates declined from 282 in 1994 to 130 in 1996. High fawn mortality in 1995 and 1996 and the death of half (8 of 16) of the adult, radio-collared pronghorn during the 13 months preceding the December 1996 survey suggests that the decline was real. Five consecutive six-month seasons of below normal precipitation (summer 1994 through summer 1996) throughout most of the Sonoran pronghorn range, likely contributed, in part, to observed mortality (Bright *et al.* 2001, Hervert *et al.* 1997b).

Adult mortality has been high in recent years, with predator-related mortality being the most frequently identifiable proximate cause of death (one of the recovery actions identified by the recovery team is development of a narrowly-defined and rigidly controlled coyote removal plan). Thirty-five adult pronghorn have been radio collared by Arizona Game and Fish Department since 1994. Of these, 31 (88 percent) have since died. A total of 13 of these mortalities were

attributed to predation, while the remaining died from unknown causes. Some of the 18 mortalities attributed to unknown causes were likely caused by predation (J. Hervert, pers. comm. 2002); however, unavoidable lag times between time of death and scene investigation caused evidence to be obscured. No evidence of predation of pronghorn was documented near water sources (Hervert *et al.* 2000). Capture myopathy (physiological condition of an animal, caused by fear, stress, and/or overexertion that sometimes manifests itself during or up to 14 days after capture; left untreated the effects can range from temporary debilitation to death) may have played a role in up to five of the mortalities in 1994 (Hervert *et al.* 2000). In the majority of documented mortalities, bone marrow condition was assessed. Only one specimen was determined to be in poor to fair condition, while all others were determined to be in good condition.

Mortality of radio-collared adults in 2002 was exceptionally high. At the start of the year, seven radio-collared Sonoran pronghorn were at large in the U.S. sub-population. By December 2002, all but one of these had died. For most, drought stress was considered to be the proximate cause. For those animals that may have succumbed to predation, it was suspected that drought stress was again a factor, by making the animal more vulnerable to predation, due to an emaciated physical condition and being forced into predator habitats by drought. Three of these 2002 mortalities were females of prime breeding age (5-7 years old) with no identifiable cause of death. Given their relatively young age, lack of any signs of disease or predation, and the timing of their deaths during one of the most severe drought years ever recorded, these animals probably died of heat stress and/or malnutrition resulting from inadequate forage conditions due to drought (J. Hervert, pers. comm. 2002). The deaths of these prime-age individuals is indicative of how severe conditions were in 2002. Three sightings last summer of pronghorn in various parts of their range verified their declining condition. In July 2002, adult pronghorn were observed on Organ Pipe Cactus NM, Cabeza Prieta NWR, and the North TAC of BMGR. In all three cases, observers described the pronghorn as emaciated, with ribs visible, and rough-coated (M. Coffeen, FWS, pers. com. 2002). In August 2000, two pronghorn were spotted on the BLM's Cameron allotment about 2-3 miles south of Ajo by a Border Patrol agent. The agent reported the animals appeared "skinny" but were not emaciated or staggering.

The 2002 drought was one of the driest on record. As an example, annual rainfall at the Organ Pipe Cactus NM visitor center was only 2.54 inches in 2002 (T. Tibbitts, Organ Pipe Cactus NM, pers. comm. 2002); *average* annual rainfall for the visitor center is 9.2 inches (Brown 1994). The extreme drought conditions profoundly affected adult pronghorn, resulting in the highest adult mortality rate documented thus far. Since 1995, adult mortality has averaged 22 percent a year. Yearly mortality rates have fluctuated around this mean in direct relationship with precipitation. In 1997 and 1999, years with relatively good rainfall, there was only 12 and 10 percent adult mortality, respectively. In contrast, during 1996, a relatively severe drought year, a 38 percent adult mortality was documented. The 2002 population survey conducted in November and December revealed the U.S. sub-population had declined to the lowest level ever recorded. A total of 18 pronghorn were observed, in three groups (8, 9, and 1). Applying these data to the Arizona Game and Fish Department sightability model results in a population estimate of 21 animals (18-33, 95 percent confidence interval), or a 79% decline from 2000. Also, very few fawns survived in 2002 to replace these dying adults. Because of the poor

condition and low survivorship of animals during the rut in late summer and early fall, there was some concern that surviving pronghorn may not have bred. However, several fawns have been detected in 2003. Adult pronghorn appear to be in good condition thus far, and the winter rains produced a good crop of ephemeral forage (J. Morgart, pers. comm. 2003).

Although drought was likely the proximate cause of the dramatic decline of the U.S. sub-population in 2002, anthropogenic factors almost certainly contributed to or exacerbated the effects of the drought. Historically, pronghorn likely moved to wetted areas and foraged along the Rio Sonoyta, Sonora, and the Gila and probably Colorado rivers during drought. These areas are no longer accessible for the U.S. population due to fences, Interstate 8, Mexico Highway 2, and other barriers. The rate of decline in the U.S. sub-population from 2000-2002 (79 percent) was also much greater than that observed in either the sub-population southeast of Highway 8 (18 percent decline) or the El Pinacate sub-population (26 percent) during the same period (see discussion of Mexican sub-populations in the next section). At least for the El Pinacate sub-population, observations of forage availability in the El Pinacate area from 2000-2002 and proximity to the U.S. population suggest the El Pinacate sub-population experienced the same severe drought that occurred on the Arizona side (T. Tibbitts, J. Morgart, pers. comm. 2003). Yet that sub-population fared much better than its U.S. counterpart. The high level of human activities and disturbance on the U.S. side, particularly in regard to undocumented alien traffic, smugglers, and law enforcement response, as compared to what occurs in the El Pinacate area, is a likely contributing factor in the difference in rate of decline observed north and south of the border. We do not have data on differences in demographics, predation rates, or other factors between Mexican and U.S. populations that may have also contributed to differences in rates of decline from 2000-2002. See the section entitled "Drought" in the Environmental Baseline and "Cumulative Effects" for further discussion.

In 1996, a workshop was held in which a population viability analysis (PVA) was conducted for the U.S. sub-population of Sonoran pronghorn (Defenders of Wildlife 1998). A PVA is a structured, systematic, and comprehensive examination of the interacting factors that place a population or species at risk (Gilpin and Soulé 1986). For the Sonoran pronghorn PVA, these factors included impacts of inbreeding, fecundity, fawn survival, adult survival, impacts of catastrophes, harvest, carrying capacity, and numbers and sex/age composition of the present population. Use of three models were discussed at the workshop, but the PVA was only completed with one of the models - Vortex (Hosack *et al.* 2002) - due to limited funding. Based on the best estimates of demographic parameters at the time, the likelihood of extinction of Sonoran pronghorn was calculated as one percent in the next 25 years, 9 percent in the next 50 years, and 23 percent in the next 100 years. More severe threats include population fluctuation, periodic decimation during drought (especially of fawns), small present population size, limited habitat preventing expansion to a more secure population size, and expected future inbreeding depression. The authors concluded that "this population of the Sonoran pronghorn, the only one in the U.S., is at serious risk of extinction." The authors made these conclusions prior to the severe drought and decline in the species in 2002. On the other hand, Hosack *et al.* (2002) found

that some management actions were possible that could improve the chances of population persistence significantly. Actions that would ameliorate the effects of drought or minimize mortality of pronghorn were of particular importance for improving population persistence.

Furthermore, the PVA suggested that the current pronghorn population is extremely sensitive to fawn mortality, with the likelihood of extinction increasing markedly when fawn mortality exceeds 70 percent. Thus, a 30 percent fawn crop (30 fawns/100 does) each year is necessary to ensure the continuance of the U.S. sub-population. This level of reproductive success has only been achieved in two of the last nine years. Fawn survival is correlated with precipitation (Hervert *et al.* 1997b). With above average precipitation in 1998, 33 fawns per 100 does were produced (Bright *et al.* 2001). In 2001, precipitation levels in the pronghorn range were the highest seen in many years. Pronghorn numbers increased from 99 in December 2000 to approximately 140 individuals in December 2001 (based on an estimated increase of 50 individuals by recruitment, minus an estimated adult mortality rate of 11 percent). However, as discussed above, during the severe drought in 2002, all the gains from the previous year were lost. Although an estimated 50 fawns were recruited into the sub-population in 2001, it appears few of these young and still-maturing animals survived the severe drought conditions of 2002. However, a dead pronghorn thought to be a 2001 fawn was discovered in 2002. The animal was obviously killed by a bobcat, but appeared to be in good condition, with lots of fat in the body cavity. The 2002 fawn crop was estimated to be from one to five (J. Morgart, pers. comm. 2002), consistent with trends of low fawn crops in low precipitation years.

The Sonoran pronghorn's previously poor status, coupled with dramatic declines in both recruitment and adult survival during 2002, have resulted in the serious imperilment of the U.S. sub-population. Actions taken by Federal and state agencies in the immediate future will determine whether the Sonoran pronghorn will continue to survive in the United States. We, in close cooperation with the Arizona Game and Fish Department, Department of Defense, and other partners are initiating a series of emergency projects, such as providing water and forage enhancement projects, as well as embarking on longer term recovery actions, including developing a semi-captive breeding facility, to increase the likelihood that the U.S. sub-population will persist (see *Emergency Recovery Actions* in the Environmental Baseline for additional information).

Mexico

Historically, Sonoran pronghorn ranged in Sonora from the Arizona border south to Hermosillo and Kino Bay, west to at least the Sierra del Rosario, and east to the area south of the Baboquivari Valley on the Tohono O'odham Nation (Nelson 1925, Carr 1974, Monson 1968). The distribution in Baja California Norte is less clear, but observations by Mearns (1907) indicate they occurred in the Colorado Desert west of the Colorado River, as well.

Sonoran pronghorn are currently extant in two sub-populations in Mexico, including: (1) west of Highway 8 near the Pinacate Lava flow; and (2) north and west of Caborca and southeast of Highway 8. In 2001, a park ranger at Pozo Nuevo, El Pinacate y Gran Desierto de Altar

Biosphere Reserve (El Pinacate), reported that pronghorn have been seen in recent years west of Volcan Pinacate to the Pozo Nuevo area, and reportedly use a cement cattle trough north of Pozo Nuevo (J. Rorabaugh, pers. comm. 2001).

Sub-populations of Sonoran pronghorn in Mexico had not been exhaustively surveyed until all suitable habitat within the current known range of the Sonoran pronghorn in Mexico was surveyed in December 2000 (Bright *et al.* 2001). Although the 1993 estimate was approximate, survey results suggested a decline in the sub-populations of 16 percent from 1993 to 2000 (Table 3). The December 2000 estimate was 346 individuals. This estimate, together with the 2001 U.S. estimate, provided a total estimated size of the U.S. and Mexico Sonoran pronghorn sub-populations in 2000-2001 of approximately 445 individuals (J.L. Bright *et al.*, Arizona Game and Fish Department, unpubl. data). Although the Sonoran pronghorn sub-populations in Mexico declined approximately 16 percent from 1993 to 2000, the decrease was not experienced equally across pronghorn range. Sonoran pronghorn habitat in Mexico is bisected by Highway 8. The sub-population southeast of Highway 8 remained stable or even increased slightly between 1993 and 2000 (Table 3). Forage conditions in 2000 were notably better in this area than the rest of Sonoran pronghorn range in Mexico and the U.S. (J. L. Bright *et al.*, Arizona Game and Fish Department, unpubl. data). The sub-population west of Highway 8 ranges throughout suitable habitat on and surrounding Volcan Pinacate, and is adjacent to the U.S. sub-population. Mexico Highway 2 (and to a lesser extent the international boundary fence) acts as a barrier to movement between El Pinacate and U.S. sub-populations. The El Pinacate sub-population declined by approximately 73 percent between 1993 and 2000 (Table 3). Dry periods and associated poor forage conditions, likely exacerbated by extensive livestock grazing, may have figured prominently in the significant decline observed in the El Pinacate sub-population. Pronghorn moving across Highway 8 to the southeast may also be an explanation for the changes in these sub-populations' sizes. Between 1993 and 2001, Highway 8 was widened and improved, increasing traffic and probably increasing its effectiveness as a barrier to pronghorn movement.

The two Mexico sub-populations were resurveyed in December 2002. A grand total (both El Pinacate and southeast of Highway 8) of 214 pronghorn in 32 groups were seen for a tentative population estimate of 280. (Note this may underestimate the sub-population due to animals that apparently moved between survey blocks between counts.) This represented a decline from the total number seen (266 - decline of 20 percent) and estimated (346 - decline of 19 percent) in December 2000. A total of 19 pronghorn were observed in the El Pinacate area for an estimate of 25. This is down from 34 estimated in 2000 (decline of 26 percent). In regard to the sub-population southeast of Highway 8, 195 pronghorn were observed, which extrapolates to an estimate of 255. This is also down somewhat from the 2000 estimate when 249 were observed, with an estimate of 311 (decline of 18 percent). Based on the 2002 surveys, the total number of pronghorn in the U.S. and Mexico is estimated at 301, a decline of 32 percent from 2000 (Bright *et al.* unpubl. data).

E. Threats

Barriers that Limit Distribution and Movement

Sonoran pronghorn require vast areas of unencumbered open range to meet their annual needs for survival and reproduction. This includes the ability to freely travel long distances between localized, seasonally sporadic rainfall events in search of forage. Highways, fences, railroads, developed areas, and irrigation canals can block these essential movements. Highway 2 in Mexico runs parallel to the southern boundary of Cabeza Prieta NWR and divides the range of the pronghorn between the U.S. and El Pinacate sub-populations. This highway supports a considerable amount of fast-moving vehicular traffic, and is fenced along its length, so is likely a substantial barrier to Sonoran pronghorn. In 1999, Dr. Rodrigo Medellin of Instituto de Ecologia reported that Sonora, Mexico is planning to widen and improve Highway 2 to four lanes, which would further reduce the likelihood of pronghorn crossing the highway.

Both Cabeza Prieta NWR and Organ Pipe Cactus NM maintain boundary fences along the border. At the southern boundary of Cabeza Prieta NWR, a seven-strand livestock fence has been a substantial barrier to pronghorn; however, some large gaps now exist in the fence, apparently as a result of theft of the fence posts and wire. The fence is periodically repaired. Modifying the fences along the U.S./Mexico border to allow pronghorn passage could aid in maintaining genetic diversity if sufficient pronghorn movement occurred. It may, however, also lead to increased pronghorn fatalities from motorized traffic on Highway 2. Mexico has been involved in discussions regarding the fences, as any modifications could potentially affect pronghorn sub-populations in both countries. Sonoran pronghorn habitat in Mexico is also bisected by Highway 8 between Sonoyta and Puerto Peñasco. This highway is bordered in part by a livestock fence and receives considerable tourist traffic. A less-traveled highway runs from Puerto Peñasco to Caborca.

Between Gila Bend and Lukeville, Arizona, SR 85 appears to be a significant barrier to pronghorn dispersal eastward from their current range. Traffic volume and average speeds have increased substantially over the last 30 years as international trade and tourism have increased. The Arizona Department of Transportation increased the posted speed limit on SR 85 from 55 to 65 miles per hour (mph) in 1997, and 85th percentile traffic speed has increased from 68-71 mph in the same period (NPS 2001). This highway corridor is unfenced in Organ Pipe Cactus NM, allowing potential free movement of pronghorn and other wildlife, but has livestock fencing on both sides for most of the remaining mileage on BLM, DoD, and private lands between Interstate 8 and Organ Pipe Cactus NM. Interstate 8, the Wellton-Mohawk Canal, agriculture, a railroad, and associated fences and human disturbance near the Gila River act as barriers for northward movement of pronghorn. De-watering of reaches of the Sonoyta River and some portions of the lower Gila River, and barriers to pronghorn accessing the Gila River, such as Interstate 8 and the Wellton-Mohawk Canal, have caused significant loss of habitat and loss of access to water (Wright and deVos 1986). Agricultural, urban, and commercial development at Sonoyta, Puerto

Peñasco, and San Luis, Sonora; in the Mexicali Valley, Baja California Norte; and at Ajo, Yuma, and along the Gila River, Arizona, have removed habitat and created barriers to movement. BLM grazing allotment fences in the Ajo area have been modified to allow safe passage of pronghorn. Although fences can be designed to encourage safe passage, pronghorn are less likely to move across any fence line, regardless of design, than through an area without fences (J. Morgart, pers. comm. 2002). The BLM proposes to lay down the fences on portions of the Cameron allotment during the summer, this proposal is scheduled to be implemented during fiscal years 2004-2006.

Historically, pronghorn occurred in the Lechuguilla Desert and in low numbers in the Colorado Desert to the west of the Gila and Tinajas Altas mountains (Mearns 1907). No apparent barrier to movement from their current range to the Lechuguilla Desert exists. Interstate 8, Mexico Highway 2, and the Gila and Tinajas Altas mountains form a substantial barrier to movement between the Lechuguilla Desert and the Yuma Desert; however, pronghorn could potentially use Tinajas Altas pass as a corridor through the mountains.

Human-caused Disturbance

A variety of human activities occur throughout the range of the pronghorn that have the potential to disturb pronghorn or its habitat, including livestock grazing in the U.S. and Mexico; military activities; recreation; poaching and hunting; clearing of desert scrub and planting of buffleggrass in Sonora; dewatering and development along the Gila River and Rio Sonoyta; increasing undocumented immigration and drug trafficking across the international border and associated law enforcement response; and roads, fences, canals, and other artificial barriers.

Studies of captive pronghorn, other than the Sonoran subspecies, have shown that they are sensitive to disturbance such as human presence and vehicular noise. Human traffic, such as a person walking or running past pronghorn in an enclosed pen, a motorcycle driving past, a truck driving past, a truck blowing its horn while driving past, or a person entering a holding pen, caused an increased heart-rate response in American pronghorn in half-acre holding pens (Workman *et al.* 1992). The highest heart rates occurred in female pronghorn in response to a person entering a holding pen, or a truck driving past while sounding the horn. The lowest heart rates occurred when a motorcycle or truck was driven past their pen. Pronghorn were more sensitive to helicopters, particularly those flying at low levels or hovering, than fixed wing aircraft. Other investigators have shown that heart rate increases in response to auditory or visual disturbance in the absence of overt behavioral changes (Thompson *et al.* 1968, Cherkovich and Tatoyan 1973, Moen *et al.* 1978).

A pronghorn can canter effortlessly at 25 mph, gallop without straining at 44 mph, and run flat out at speeds of 55-62 mph (Byers 1997). During an aerial reconnaissance, one herd of Sonoran pronghorn was observed 12 miles away from the initial observation location 1.5 hours later (Wright and deVos 1986). Hughes and Smith (1990) found that pronghorn immediately ran 1,310-1,650 feet from a vehicle, and that military low-level flights (<500 feet AGL) over three pronghorn caused them to move about 330 feet from their original location. Krausman *et al.*

(2001) examined effects of military aircraft and ground-based activities on Sonoran pronghorn at the North and South TACs and concluded that behavioral patterns were similar with and without presence of military stimuli. Military activities, both ground-based and aerial, were associated with some changes in behavior (e.g., from standing to trotting or running, or bedded to standing) but the authors concluded that these changes were not likely to be detrimental to the animals. Eighty-seven (4.1 percent) of the 2,128 events with ground-based stimuli resulted in pronghorn changing their behavior to trotting or running; a total of 866 (41 percent) resulted in some change in behavior. Krausman *et al.* (2001) documented 149 direct overflights and 263 other overflights (in which the aircraft passed ≥ 328 feet to the side of the animal). Pronghorn changed their behavior 39 and 35 percent of the time during direct and other overflights, respectively. Krausman *et al.* (2001) did not address the pronghorn's response to low-level helicopter flights. A study is being developed to quantify effects of helicopter flights by the Border Patrol on Sonoran pronghorn (J. deVos, Arizona Game and Fish Department, pers. comm. 2002). No conclusions could be drawn about effects to fawns due to poor fawn productivity during the Krausman *et al.* study. During times of drought, disturbances that cause pronghorns to startle and run would energetically have a more significant effect. Such energetic expenditures, particularly during times of stress, may lead to lower reproductive output and/or survival of individual animals (Geist 1971).

Habitat Disturbance

Livestock grazing has the potential to significantly alter pronghorn habitat and behavior (Leftwich and Simpson 1978, Kindschy *et al.* 1982, Yoakum *et al.* 1996). This is especially true in the arid Sonoran Desert. Cattle and other domestic livestock were first brought to northwestern Sonora, Mexico, in 1694 (Wildeman and Brock 2000). Overgrazing well into the 19th century by Spaniards and their descendants caused widespread habitat changes throughout much of the Sonoran Desert, particularly in more settled areas such as central Sonora, Mexico (Sheridan 2000).

American ranchers were running livestock by the early 1900s in much of the area that would later become Organ Pipe Cactus NM (Rutman 1997) and Cabeza Prieta NWR (Cabeza Prieta NWR files). Because there was no international boundary fence until 1947, livestock from both the U.S. and Mexico ranged freely across the border (Rutman 1997). Rutman (1997) estimates 1,000 head of burros and horses were present in 1942 on the southern half of Organ Pipe Cactus NM, and as many as 3,000 cattle were present on Organ Pipe Cactus NM at one time. Cattle were removed from Organ Pipe Cactus NM, Cabeza Prieta NWR, and the BMGR in 1979, 1983, and 1986, respectively (U.S. Fish and Wildlife Service 1998a, Rutman 1997). Grazing continues to be an important use of currently used pronghorn habitat on BLM lands south of Ajo, former pronghorn habitat on the Tohono O'odham Nation and the Altar Valley, and in current and former habitats in Sonora. Wright and deVos (1986) stated that poor habitat conditions (caused in part by livestock grazing) still appeared to be the leading cause in the decline in Sonoran pronghorn numbers. In Sonora, livestock grazing occurs in ejidos (community ranches or farms) and other ranch lands throughout much of the range of the pronghorn. Cattle range farther in years with abundant annual growth and are more limited to areas near water during hot and dry periods and seasons.

Mining occurred historically throughout much of the U.S. range of the pronghorn. Miners probably hunted pronghorn and disturbed habitat locally. Mining is currently not a significant threat to Sonoran pronghorn in the U.S. No mining occurs now on the BMGR or Organ Pipe Cactus NM. Cabeza Prieta NWR has one active mining claim. The open pit and associated tailings piles at the Phelps Dodge copper mine at Ajo eliminated habitat in that area (Marine Corps Air Station (MCAS)-Yuma 2001, NPS 2001), but the mine is no longer in operation. During pronghorn surveys in Mexico in 2002, increasing effects from mining activities were noted in habitats used by the sub-population located southeast of Highway 8.

Illegal crossings by undocumented immigrants and drug smugglers in the U.S. range of the pronghorn have increased dramatically in recent years. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station increased steadily from 9,150 in 1996 to 20,340 in 2000 (U.S. Immigration and Naturalization Service 2001). In 2001, estimates of undocumented migrants traffic reached 1,000 per night in Organ Pipe Cactus NM alone (NPS 2001), and an estimated 150,000 people entered the monument illegally from Mexico (Milstead and Barns 2002). Illegal border-related activities and Border Patrol response have resulted in widespread habitat degradation and increased human presence in remote areas. Increased presence of Border Patrol in the Douglas, Arizona area, and in San Diego (Operation Gatekeeper) and southeastern California, have pushed undocumented migrant traffic into remote desert areas, such as Cabeza Prieta NWR, Organ Pipe Cactus NM, and the BMGR (Klein 2000).

Small Population Size and Random Changes in Demographics

A possible minimum viable population for pronghorn is 50 animals (Reed *et al.* 1986, Scott 1990). At populations of less than 100, population viability declines at an increasingly steep rate. To maintain genetic diversity over the long term, a population of at least 500 is desirable (Defenders of Wildlife 1998). The U.S. sub-population is now estimated at 21 after the 2002 drought. At an estimated 25 in 2002 the El Pinacate sub-population is also well below the possible minimum viable population. Thus, 2 of the 3 pronghorn sub-populations are seriously endangered. At 280 animals, the third sub-population (southeast of Highway 8) may be too small to maintain genetic diversity. Loss of the U.S. sub-population would dramatically reduce our ability to manage or recover this subspecies. Populations at low levels may experience random variations in sex ratios, age distributions, and birth and death rates among individuals, which can cause fluctuations in population size and possibly extinction (Richter-Dyn and Goel 1972). The sex ratio as of December 2002 was skewed in favor of females (male:female ratio of 6:15, J. Morgart, pers. comm. 2003), which may be advantageous in regard to reproductive potential. However, the small number of males may mean that some females may not encounter and breed with a male. In the future, a scenario in which males outnumber females by a similar margin is just as likely. In very sparse populations, males may have trouble finding females, reducing productivity (Ehrlich and Roughgarden 1987). Small populations are also sensitive to variations in natural processes, such as drought and predation (Hecht and Nickerson 1999).

In 2000, we were concerned that, because of limited recruitment over the last seven years, an estimated 56 percent of the sub-population was more than six years of age. Pronghorn rarely live more than nine years (Bright *et al.* 2001). However, the pronghorn that survived severe conditions in 2002 are likely younger animals (J. Hervert, pers. comm. 2003).

Disease

Sonoran pronghorn can potentially be infected by at least one bacterial (leptospirosis) and two viral (bluetongue and epizootic hemorrhagic disease) diseases. Bluetongue virus and epizootic hemorrhagic disease virus together produce a hemorrhagic disease syndrome. Pronghorn are susceptible to an additional two bacterial (Arcanobacterium and Fusobacterium) and four viral (parainfluenza, St. Louis encephalitis, vesicular stomatitis, and malignant catarrhal fever) diseases. Blood testing has shown pronghorn exposure to these diseases by increases in antibody titers over time. A number of other viral diseases, in particular, are known to affect North American ungulates and antelope and gazelle worldwide, including but not limited to, infectious bovine rhinotracheitis, bovine viral diarrhea and bovine syncytial virus (Williams and Barker 2001).

Animals in general are subject to increased disease susceptibility when either very young, very old and debilitated, and/or stressed. The manner in which a particular disease is spread can also be a factor in disease risk. The diseases relevant to pronghorn can be transmitted indirectly through vectors, such as infected midges or ticks, or directly via aerosolized or direct contact of infected fluids or tissues. All the diseases are serious diseases of cattle, as well, and often lead to mortality. Cattle within the current range of the pronghorn have not been tested for these diseases:

The most serious of the diseases are two viruses, bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV), which together produce hemorrhagic disease (HD) syndrome. HD, in particular, can be spread by infected cattle via fecal contamination. Bovine feces are moist and voluminous, and at watering sources where animals congregate in large numbers, this fecal material is trampled into the soil, causing a substrate and odor that attract insects that are vectors capable of spreading the HD viruses from one animal to another nearby. Pronghorn, deer, and other wild ungulates produce drier, less voluminous, pelleted feces, which are less likely to produce moisture or odors that attract vectors, such as flies or midges.

Overcrowding at essential congregating areas, such as watering sources, particularly in times of drought is another factor that sets up an optimal situation for such disease transmission. Animals are competing for scarce resources and, particularly in times of severe drought, are stressed and debilitated.

Control of diseases in general can be managed in many cases by following often-used animal husbandry practices, including: 1) keeping hosts prone to infection (such as pronghorn and cattle)

separated; 2) keeping vectors under control by ensuring that moist fecal material build-up at crucial areas (such as watering sources), does not occur; and, 3) keeping overcrowding, overconcentration, stressful competition and direct contact among animals to a minimum.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, state, or private actions in the action area; the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation; and the impact of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform from which to assess the effects of the action now under consultation.

Sonoran Pronghorn

A. Action Area

The “action area” means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. Within the U.S. portion of the Sonoran pronghorn’s range, pronghorn interact to form one sub-population in which interbreeding may occur. The U.S. sub-population is effectively separated from sub-populations in the El Pinacate Region and on the Gulf Coast of Sonora by Mexico Highways 2 and 8, and the U.S.-Mexico boundary fence. Activities that may affect animals in any portion of the U.S. range of the pronghorn may affect the size or structure of the U.S. sub-population, or habitat use within the U.S. range. The action area for this biological opinion is defined as the range of the pronghorn within the U.S. (Figure 5), plus areas of Organ Pipe Cactus NM east of SR 85 not currently used by pronghorn. Although this entire area is affected, at least indirectly, by the proposed action, effects of the proposed action are most evident where NPS activities will occur within the Monument.

Management of the action area is almost entirely by Federal agencies. As discussed above, the BMGR (roughly 1.6 million acres) is managed by Luke Air Force Base and MCAS-Yuma primarily for military training. Organ Pipe Cactus NM manages 329,000 acres in the southeastern corner of the action area for scenic, ecological, natural, and cultural values. Cabeza Prieta NWR lies along the border west of Organ Pipe Cactus NM and encompasses 860,000 acres. Cabeza Prieta NWR is managed to protect, maintain, and restore the diversity of the Sonoran Desert. Most of the refuge and Organ Pipe Cactus NM are designated as wilderness. The BLM manages lands near Ajo for recreation, grazing (four livestock grazing allotments totaling 191,740 acres, and one allotment totaling 21,876 acres), and other multiple uses in accordance with the Lower Gila Resource Management Plan.

B. Terrain, Vegetation Communities, and Climate in the Action Area

The action area is characterized by broad alluvial valleys separated by block-faulted mountains and surface volcanics. The Yuma Desert on the western edge of the BMGR is part of a broad valley that includes the Colorado River. It is bordered on the east by the Gila and Tinajas Altas

mountains. To the east of these mountains are a series of basins and ranges; from west to east these include the Lechuguilla Desert; the Cabeza Prieta and Copper Mountains; the Tule Desert and Mohawk Valley, including the Mohawk Dunes and Pinta Sand Dunes; the Sierra Pinta, Mohawk, and Bryan mountains; the San Cristobal Valley; the Aguila and Granite mountains; the Growler Valley; the Crater Range, Growler, Bates, and Agua Dulce mountains; and the La Abra Plain and Puerto Blanco Mountains west of SR 85, eastward to the base of the Ajo Mountains. Elevations range from 180 feet in the southwestern corner of the BMGR to 3,294 feet in the Growler Mountains. Major drainages and mountain ranges run northwest to southeast. The mountains are of two major types: a sierra type, composed of metamorphic and granitic rock, and a mesa type, typically of basaltic composition. Major drainages flow mostly northward to the Gila River, although southern portions of Organ Pipe Cactus NM and the southern slope of the Agua Dulce Mountains drain south to the Rio Sonoyta, Sonora.

Climate is characterized by extreme aridity, mild winters, and hot summers. Approximately 2.7 inches of precipitation fall annually at Yuma, with slightly more than half of this occurring in the winter months (Brown 1994). Annual precipitation increases from west to east across the BMGR; at Aguajita/Quitobaquito, precipitation is 10.5 inches annually. Infrequent chubascos (tropical storms) bring heavy rains in September or October that can produce spectacular growth on warm-season perennial plants (Felger 2000).

The vegetation community of the western portion of the BMGR has been classified as the lower Colorado River Valley subdivision of Sonoran Desert scrub (Brown 1994). It is the largest and most arid subdivision of Sonoran Desert scrub. Vegetation in the valleys, particularly in the Yuma Desert, is dominated by the creosote-white bursage series of Sonoran Desert scrub (Brown 1994). This series occupies approximately three-fourths of the lowland or valley areas in the BMGR (Reichenbacher and Duncan 1989). In this series, creosote and white bursage are often co-dominants, with galleta grass (*Pleuraphis rigida*), dalea (*Psoralthamnus emoryi*), coldenia (*Tequilia plicata*) and other locally abundant species. Distinctive floras are also found in dunes in the area, particularly in the Yuma Dunes west of the Tinajas Altas Mountains, at Pinta Sands, and at the Mohawk Dunes. Species such as dune buckwheat (*Eriogonum deserticola*), Mormon tea (*Ephedra trifurca*), bugseed (*Dicoria canescens*), dune spurge (*Euphorbia platysperma*), possibly the threatened Peirson's milkvetch (*Astragalus magdalenae peirsonii*), and wire lettuce (*Stephanomeria schotti*) are found in one or more of these dune habitats. These species are dune specialists typical of the Gran Desierto dunes in northwestern Sonora (Felger 2000).

In drainages, bajadas, and montane habitats (including the Mohawk, Cabeza Prieta, Granite, and the Sierra Pinta mountains), the mixed scrub series of the lower Colorado River subdivision (Brown 1994) is found. This community is more diverse than the creosote-bursage series and includes species more representative of the Arizona Upland subdivision of Sonoran Desert scrub, such as palo verde, saguaro (*Carnegia gigantea*), ironwood, and desert lavender (*Hyptis emoryi*),

among others. Frost-sensitive species such as elephant tree (*Bursera microphylla*), limber bush (*Jatropha cuneata*), and Mexican jumping bean (*Sebastiania biloculare*) are also found in this community, but are more representative of species and genera of the Central Gulf Coast subdivision of Sonoran Desert scrub found to the south in Sonora (Dames and Moore 1995, Brown 1994).

The Arizona Upland subdivision of Sonoran Desert scrub is found in the Growler, Puerto Blanco, Ajo and Bates mountains, and surrounding bajadas. Vegetation in this community takes on the appearance of a scrubland or low woodland of leguminous trees, shrubs, and cacti. The woodland component is most developed and species richness is greatest in drainages. In the action area, common trees of the Arizona Upland include palo verdes, ironwood, catclaw acacia, and velvet mesquite (*Prosopis velutina*). Dominant cacti include saguaro, chain fruit cholla, teddy bear cholla, and organ pipe cactus. Senita cactus (*Lophocereus schottii*), more common to the south in Mexico, is found in the southern portion of Organ Pipe Cactus NM and the Agua Dulce Mountains, Cabeza Prieta NWR. Vegetation on Cabeza Prieta NWR, Organ Pipe Cactus NM, and most of the BMGR is relatively undisturbed by human activities, although the increasing numbers of immigrants and smugglers, and law enforcement response, across these areas are resulting in elevated resource damage.

C. Status of the Sonoran Pronghorn in the Action Area

Distribution

Figure 5 illustrates records of Sonoran pronghorn in Arizona from 1994-2001. Additional locations are available, but they are few in number due to the loss of all telemetered pronghorn by July 2002 (all observations since then have been incidental) and the U.S. sub-population is at its lowest level ever recorded. Based on these locations and observed locations of pronghorn from 1983-1993, pronghorn have occurred most frequently in the following areas: Pinta Sands, Growler Valley, Mohawk Valley, San Cristobal Valley, and between the Growler and Little Ajo mountains (Daniel's Arroyo area). All localities from 1994-2001 are south of Interstate 8, east of the Copper and Cabeza Prieta mountains, and west of SR 85 (Bright *et al.* 2001). Pronghorn historically crossed SR 85 to use bajada habitats in eastern portions of Organ Pipe Cactus NM, and may still attempt to do so as indicated by the presence of the two radio-collared pronghorn which moved into areas east of SR 85 during summer 2002, and an animal that crossed SR 85 in July 2003. Habitat north of Interstate 8 has not been surveyed to any extent for pronghorn, but habitat in the vicinity of the Gila River is highly fragmented. Interstate 8 and the Wellton-Mohawk Canal are probably barriers to movement of pronghorn. The current range of the U.S. population of the Sonoran pronghorn encompasses 1,764,568 acres, of which 1,579,588 acres are suitable habitat (excluded are mountainous areas with the current range). Of the suitable habitat, 14 percent is located in BMGR-West, 28 percent in BMGR-East and 39, 12, four, one, and one percent are owned/managed by Cabeza Prieta NWR, Organ Pipe Cactus NM, BLM, Arizona State Land Department, and private individuals, respectively (URS Corporation 2003).

On Cabeza Prieta NWR, pronghorn groups were most often observed on the southwestern edge of the Sierra Pinta Mountains and in the Pinta Sands, in the valley between the Sierra Pinta and Bryan mountains, the Antelope Hills between the Bryan and Agua Dulce mountains, the San Cristobal and Growler valleys, and near Daniel's Arroyo. At Organ Pipe Cactus NM, pronghorn were most often observed near Acuna and Bates wells, and west of the Bates Mountains and Cipriano Hills. On the BMGR, concentrations of animals were observed near HE Hill on South TAC, with scattered sightings through the San Cristobal Valley and into the Mohawk Valley. John Hervert (Arizona Game and Fish Department, pers. comm. 1996) has numerous locations of pronghorn in the northern portion of the Agua Dulce Mountains near Antelope Tank. Pronghorn may have used the Pinta Sands area to a greater degree in the early 1970s (Arizona Game and Fish Department 1981).

Pronghorn often seek the thermal cover found in the Arizona Upland subdivision of Sonoran Desert scrub during the hot, dry summer months. This cover is best developed in the southeastern portion of their range in Arizona. With the onset of summer rains or cooler temperatures, pronghorn may move to the more open valleys and flats, such as the Growler Valley and Pinta Sands. Rocky, mountainous terrain, such as the slopes of the Growler or Mohawk mountains, is not considered habitat for the Sonoran pronghorn (deVos 1990); however, pronghorn may be found on lower slopes and in associated washes (L. Thompson-Olais, FWS, pers. comm. 1996).

Drought

Rowlands (2000) examined trends in precipitation for southwestern Arizona and Organ Pipe Cactus NM from 1895-1999. For southwestern Arizona, no trend in precipitation was found for the period, but low precipitation occurred around 1895 and during the 1950s. Periods of high precipitation occurred in 1915-1920 and in the 1980s. For Organ Pipe Cactus NM, there was a slightly increasing trend in monthly and annual precipitation over the period 1895-1999, a strong drought occurred in the 1950s, and a lesser drought occurred in the 1970s (e.g. Felger [1980] notes a 34-month period, from September 1969-August 1972, without precipitation in the Sierra del Rosario, Sonora). No discernable trend in precipitation in southwestern Arizona or Organ Pipe Cactus NM was found in the 1990s, which is when the current decline in the U.S. pronghorn population began. At four stations in southwestern Arizona, Hervert *et al.* (2000) note below normal precipitation in the winters of 1995/1996 (-2.78 inches) and 1996/1997 (-2.87 inches), and wet winters in 1994/1995 (+1.97 inches) and 1997/1998 (+4.29 inches). Annual plant production was exceptional in the winter of 1997/1998 and spring of 1998. The winter of 1992/1993 and spring of 1993 also saw a very good crop of annual plants. Because of increased precipitation, the eastern portions of the pronghorn's current range, including Organ Pipe Cactus NM, are most likely to support annual plant production, and thus are disproportionately important to the pronghorn.

NPS (2001) examined available data on precipitation and concluded that "although substantial year-to-year variations exist, the general trend in the later 20th century has been one of slightly increasing rainfall" at Organ Pipe Cactus NM. Since Rowland's analysis, we have had one year

characterized by above-average rainfall and abundant ephemeral forage (2001) and a year with virtually no precipitation or ephemeral forage (2002). Consistent with the findings of Hervert *et al.* (2000) and Bright *et al.* (2001), reproduction and survival were high in 2001 and very low in 2002. Historically, pronghorn populations must have weathered many severe droughts in the Sonoran Desert, including many that were more severe and longer term than what occurred in 2002. Given that pronghorn populations survived the droughts of the 1890s, 1950s, 1970s, and others before those it is unreasonable to solely attribute recent declines in the U.S. pronghorn population to drought. NPS (2001) concluded, "If (individual) recent dry years have had an impact on Sonoran pronghorn, it is most likely because in recent decades Sonoran pronghorn have much more limited options for coping with even brief moderate drought. Because of restrictions on their movements and range, and increasing human presence within their range, pronghorn are less able to employ their nomadic strategy in search of relief. It is not that drought itself is an impact, but possibly that drought has *become* an impact, due to other factors confounding the species' normal ecological strategy."

Emergency Recovery Actions

A number of critically important emergency recovery projects have been recently initiated in an attempt to reverse the decline of the U.S. sub-population of the Sonoran pronghorn. These projects are designed to increase availability of green forage and water during dry periods and seasons within the current range of the pronghorn, thereby offsetting to some extent the effects of drought and barriers that prevent pronghorn from accessing greenbelts and water, such as the Gila River and Rio Sonoyta. A semi-captive breeding facility will also provide a safe haven for pronghorn that hopefully will bolster the wild population. In March 2003, with funding from MCAS-Yuma and support from Bureau of Reclamation-Yuma Area Office, the Service, and Arizona Game and Fish Department, a well (Tiller Well) was drilled in Childs Valley on Cabeza Prieta NWR. In May 2003, infrastructure was put in place to pipe water to a forage enhancement plot and water trough about 1.5 miles from the well. About 6.5 acres are currently being irrigated, perennial vegetation has responded, and on June 9, pronghorn tracks were found in the plot, and the next day a pronghorn was observed in the vicinity of and moving towards the plot. In mid June a group of six (one adult male, 2 adult females, and 3 fawns) were observed near and on the plot (J. Morgart, pers. comm. 2003). Funding from MCAS-Yuma had originally been targeted for a forage enhancement plot in the Mohawk Valley of BMGR-West; however, the pronghorn recovery team requested that the funds be redirected to the Childs Valley site where it was thought pronghorn were more likely to immediately benefit from the project. MCAS-Yuma graciously agreed to redirect the funds.

Antelope Tank on the refuge has recently been redeveloped with a larger, more reliable and larger capacity, self-filling catchment system that should provide an important water source for pronghorn. Three temporary, emergency waters have been placed in remote areas of the refuge and Organ Pipe Cactus NM. Also, two badly-degraded segments of the Camino del Diablo have been repaired with airport matting, allowing access to recovery project sites. Other projects that are in development include additional emergency waters, redevelopment of two older existing wells in important pronghorn habitat on Cabeza Prieta NWR, additional forage enhancement

plots, roadside watering to encourage ephemeral forage growth, initiation of a semi-captive breeding facility on the refuge, and opening of negotiations with our counterparts in Mexico for acquiring pronghorn from Mexico for augmenting the U.S. and Mexico sub-populations. The semi-captive breeding facility, under construction on the eastern side of Cabeza Prieta NWR, will initially house five pronghorn in a kilometer square enclosure equipped with a forage enhancement facility and waters. The initial five animals are expected to be obtained from Mexico. The facility is based on a successful semi-captive facility in place for the peninsular subspecies of the pronghorn in Baja California. We anticipate that the facility will provide a safe and productive environment in which fawns will be produced for release into the wild population. These crucial projects, which we hope will pull the U.S. population back from the brink of extinction, have been cooperative efforts among the Service, Arizona Game and Fish Department, MCAS-Yuma, Luke Air Force Base, and Organ Pipe Cactus NM, with volunteer efforts from the Arizona Desert Bighorn Sheep Society, Arizona Antelope Foundation, and the Yuma Rod and Gun Club.

D. Past and Ongoing Non-Federal Actions in the Action Area

The Status of the Species section describes a variety of human activities that have affected the Sonoran pronghorn since initiation of livestock grazing over 300 years ago (Officer 1993). Most non-Federal activities that have affected the pronghorn are historical in nature, and pronghorn have been all but extirpated from private, state, and Tribal lands.

Before the Taylor Grazing Act of 1934, and land use designations such as Organ Pipe Cactus NM, the BMGR, and Cabeza Prieta NWR, unregulated cattle grazing was widespread in the current range of the pronghorn. Forage and precipitation is greater in the eastern portion of the current range, thus it is likely that grazing was more prevalent in BMGR-East, Cabeza Prieta NWR and Organ Pipe Cactus NM, than in BMGR-West (MCAS-Yuma 2001). However, cattle grazing presently occurs west of Volcan Pinacate and near the Sierra del Rosario in northwestern Sonora, which are as dry as much of BMGR-West; thus we suspect cattle grazing historically occurred throughout the current U.S. range. The degree to which cattle grazing may have affected soils and vegetation communities in this area is impossible to quantify. Humphrey (1987) compared vegetation in early photos taken at boundary monuments in the early 1890s with photos taken in the 1980s and could not discern any temporal differences in vegetation in what is now Organ Pipe Cactus NM, Cabeza Prieta NWR, and BMGR. However, the changes may have occurred before 1890. In reference to monument 172 at the southern end of the Quitobaquito Hills, Humphrey notes “the entire region near the spring has probably been grazed by domestic livestock since their introduction by the Spaniards in the early eighteenth century. Any grasses that might have grown there prior to that time had probably been grazed out long before the monument was erected.” NPS (2001) discusses possible effects of long-term grazing in pronghorn habitat, and apparent evidence and impacts of grazing still visible at Organ Pipe Cactus NM 25 years after cattle were removed.

Before the establishment of Organ Pipe Cactus NM, BMGR, and Cabeza Prieta NWR, mining occurred in many of the mountain ranges of the area. The copper mine at Ajo was operated by

Phelps Dodge Corporation and others from 1911 to 1985. The open pit mine and its tailings eliminated pronghorn habitat east and southeast of Ajo. Smaller mining operations caused habitat disturbance locally, but most mines were in mountainous terrain outside of pronghorn habitat.

Hunting and poaching may have been an important factor historically in the decline of pronghorn populations early in the 20th century; however, the Sonoran pronghorn has been protected from hunting in the U.S. for more than 50 years. We are not aware of any recent poaching events (U.S. Fish and Wildlife Service 1998a); but finding evidence of poaching would be difficult across the remote landscape inhabited by this subspecies. Recreational hunting for other species occurs within the U.S. range of the pronghorn. Of particular importance is the bighorn sheep season, which occurs in December of each year, when a small number of hunters access remote portions of Cabeza Prieta NWR and BMGR to hunt a limited number of sheep. Presence of hunters in pronghorn habitat and discharge of firearms has the potential to disturb pronghorn; however, sheep hunting occurs at a time of year when temperatures are moderate, and hunters focus their activities in the mountains whereas pronghorn are in the valleys and bajadas.

Development of agriculture, including construction of canals, roads, towns, a railroad, and other activities along the Gila River excluded pronghorn from the riparian habitats, shade, forage, and water available along the river. Similarly, construction of Sonora Highway 2, the U.S./Mexico boundary fence, and towns and agriculture along the Rio Sonoyta, excluded pronghorn from these riparian habitats, as well. Flow in the Gila and Sonoyta rivers are now much reduced or restricted to return agricultural flows or periodic flood flows. These greenbelts may have been a source of water and forage, and probably acted as buffers, to enhance survival of pronghorn during drought periods (U.S. Fish and Wildlife Service 1998a).

Numbers of undocumented immigrants and smugglers have increased dramatically in the action area. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station increased steadily from 9,150 in 1996 to 20,340 in 2000 (U.S. Immigration and Naturalization Service 2001). In 2001, estimates of undocumented migrant traffic reached 1,000 per night in Organ Pipe Cactus NM alone (NPS 2001), and 150,000 for the year (Milstead and Barns 2002). Numbers of illegal crossings through the BMGR increased in the mid to late 1990s after Border Patrol stepped up their presence in border cities. Apprehensions in the BMGR by Border Patrol were 9,500, 11,202, and 8,704 in 1996, 2000, and 2001, respectively (URS Corporation 2003). These illegal crossings and law enforcement response have resulted in route proliferation, off-highway vehicle (OHV) activity, increased human presence in backcountry areas, discarded trash, and vehicles abandoned by smugglers. Habitat degradation and disturbance of pronghorn almost certainly results from these illegal activities. Increased illegal activities have precipitated increased law enforcement presence, with additional associated adverse effects. However, without Border Patrol efforts the impacts from undocumented immigrants would be even greater. Some discussions are occurring between Mexican and U.S. officials about the creation of a guest worker program whereby Mexican nationals could legally cross the border to work in the U.S. If

such a program was initiated, it might greatly reduce illegal immigration and law enforcement response, with concomitant reductions in habitat degradation and suspected disturbance of pronghorn that have increased so dramatically in recent years.

E. Past and Ongoing Federal Actions in the Action Area

Because of the extent of Federal lands in the action area, most activities that currently, or have recently, affected pronghorn or their habitat are Federal actions. The primary Federal agencies involved in activities in the action area include the MCAS-Yuma, Luke Air Force Base, the Service, BLM, Organ Pipe Cactus NM, and Border Patrol.

Resource management on and near the BMGR is coordinated through the Barry M. Goldwater Executive Council (BEC), a group of Federal and state agency representatives with statutory authority and management responsibility for the BMGR, its resources, and adjacent Federal lands. Formalized in March 1998, the BEC provides a conduit for communication regarding resource management issues, conflicts, and planning on the BMGR. Membership on the council includes representatives from Luke Air Force Base, MCAS-Yuma, the Phoenix and Yuma field offices of BLM, Cabeza Prieta NWR and this office, Organ Pipe Cactus NM, Arizona Game and Fish Department, and Tucson and Yuma sectors of the Border Patrol. No single agency serves as the council lead, and the organization operates on a consensus basis. One subcommittee of the BEC is dedicated to Sonoran pronghorn. The MLWA of 1999 called for the establishment of a coordinating committee to act as an advisory group to land management agencies regarding management practices on the BMGR. This committee, the Intergovernmental Executive Committee (IEC), was convened in January 2002 and meets regularly.

Arizona Game and Fish Department, working in cooperation with a number of Federal agencies, has captured and radio-collared a total of 35 adult Sonoran pronghorn since 1994; 22 in 1994, nine in 1997/98, and four in 2000. Five pronghorn captured in 1994 died within 1-33 days post-capture. Three of these mortalities were from unknown causes, while two appeared predator-related (mountain lion and coyote). Since it is unusual to have this many animals die within 40 days post-capture, the direct or indirect effects of capture myopathy, was a suspected factor in their deaths. Capture and handling procedures were immediately modified and no losses related to capture myopathy have occurred in subsequent capture operations. A sixth animal died from a broken neck caused by capture operations in December 2000. Despite these detrimental effects, data collected through radio telemetry are ultimately of great benefit to the conservation of the subspecies. Telemetry data provide information regarding habitat use and requirements, movement patterns, and increase the validity of population estimates. No pronghorn have been captured or telemetered since 2000.

In the following discussion, we have categorized Federal actions affecting the pronghorn as: 1) those actions that have not yet undergone section 7 consultation (although in some cases consultation has been completed on components of the Federal activity), and 2) Federal actions that have undergone consultation.

*Federal Actions For Which Consultation Has Not Been Completed*Management at Cabeza Prieta NWR

Over 90 percent of Cabeza Prieta NWR was designated by Congress as wilderness in the 1990 Arizona Wilderness Act. To help maintain wilderness character, no vehicular traffic is allowed except on designated public use roads. Vehicles may be parked up to 50 feet from the center of the roads in areas previously used by other vehicles. All other off-road travel is prohibited. Visitors are encouraged to practice a "leave no trace" ethic. Recreational activities on the Cabeza Prieta NWR include backpacking, hunting, photography, camping, rock climbing, mountain biking, and driving on roads. Before entering, visitors must obtain a valid Refuge Entry Permit and sign a Military Hold Harmless Agreement.

Four-wheel drive vehicles are required on all routes except Charlie Bell Road where 2-wheel drive high-clearance vehicles may be driven. Driving in wet areas is prohibited and visitors are encouraged to not travel during wet conditions due to possible damage to refuge roads. In addition to the prohibitions mentioned above, the following activities are prohibited: dumping of litter, sewage, or liquid waste; firearms, except as authorized in writing by the Cabeza Prieta NWR manager; prospecting, removal, or disturbance of sand, rock, gravel, or minerals; rock hounding; excavating or removing objects of antiquity, cultural artifacts, or paleontological artifacts; trapping; collecting, possessing, molesting, disturbing, injuring, destroying, removal, or transportation of any plant, or animal, or part of the natural flora and fauna on the NWR (exceptions to the above are legally taken game); wood campfires; and unleashed pets.

The management plan for the Cabeza Prieta NWR includes an endangered species management component (U.S. Fish and Wildlife Service 1998b). Activities in this component include the use of remote sensors in coordination with the Border Patrol, an increase in monitoring, forage enhancement plots, a semi-captive breeding facility, and the possibility of the establishment of experimental waters for pronghorn. Specific objectives concerning management goals for the pronghorn were presented in a preliminary draft Comprehensive Conservation Plan (CCP) for the Cabeza Prieta NWR (U.S. Fish and Wildlife Service 1998b) and included coordination with Arizona Game and Fish Department to conduct aerial surveys, weekly telemetry flights, radio-collaring operations, digital vegetation mapping, food plot feasibility studies, installation of water developments with photomonitors to document pronghorn use, telemetry tracking using remote data loggers, and coordination with Mexican authorities on pronghorn populations south of the border. Work continues on the CCP; the draft EIS is expected to be completed in 2003. When the CCP is drafted, we will conduct section 7 consultation on that plan if listed species or critical habitat may be affected. In the interim, we conduct section 7 interagency consultation on individual actions when they are proposed.

Cabeza Prieta NWR provides habitat for the pronghorn and is actively working to conserve the species. However, the presence of humans within pronghorn habitat may constitute a major

disturbance factor. Furthermore, human presence may restrict pronghorn access to cover and/or forage and effectively create a barrier to movement.

Tucson Sector of the Border Patrol

The Tucson Sector Border Patrol section 7 consultation is not yet complete (consultation number 02-21-99-I-138). We have received three draft BA packages and expect to receive a fourth revised draft in the near future. This consultation encompasses all field activities conducted by the Border Patrol-Tucson Sector, as part of the program to detect, deter, and apprehend undocumented immigrants and drug traffickers. Also included will be the patrol operation, Operation Grip, initiated in 2003, which is being conducted on the Los Vidrios Trail area of the Agua Dulce Mountains on Cabeza Prieta NWR. As part of this operation, trailers, which serve as living quarters for Border Patrol agents, have been placed near Bates Ranch on Organ Pipe Cactus NM. Additionally, we are currently in consultation with Border Patrol on a proposal to place six emergency beacons within pronghorn habitat so that undocumented aliens in distress can call for help.

The Tucson Sector is comprised of nine stations. Activities within the Ajo Station have the greatest potential to adversely affect pronghorn. Adverse effects may result from patrol road activities, drag road activities, off-road operations, aircraft overflights, and the use and maintenance of sensors. Furthermore, the potential for disturbance to pronghorn due to human presence may increase in areas where agents live on site (i.e., Operation Grip). Border Patrol activities can be beneficial as well, in that they deter illegal border crossings, foot traffic, and off-road vehicles in pronghorn habitat associated with undocumented aliens and smuggling.

Patrol roads used by Border Patrol agents are typically public or private ranch roads. Although the Border Patrol is not the primary user of these roads, they do have the potential to encounter Sonoran pronghorn during patrols and cause them to flee the area. The Border Patrol monitors tracks of undocumented immigrants on drag roads (dirt roads that are regularly cleared by dragging tires behind a vehicle and then monitored for human tracks). Less than 10 miles of drag roads are used by the Ajo Station. Pronghorn appear to have an affinity for drag roads as the process of preparing the roads promotes forb growth (J. Hervert, pers. comm. 1999). Additionally, these roads may be utilized by pronghorn as bedding areas due to greater predator detection resulting from increased visibility (J. Hervert, pers. comm. 1999). Pronghorn attracted to these areas may be adversely affected by the presence of patrols and road preparation activities. Sensors are placed at strategic locations along the U.S.-Mexico border on established roads or trails within known travel corridors to detect illegal activities. The Ajo Station uses and maintains approximately 85-90 sensors during daily operations. Sensor installation and/or maintenance activities could disturb pronghorn if they are in the immediate area. However, these disturbances should be infrequent and short in duration.

Off-road activities include agents on foot, the use of OHVs, including four-wheel drive vehicles, dirt bikes, and all-terrain vehicles. These activities may disturb pronghorn and disrupt normal behavioral activities. Motorized off-road activities also degrade pronghorn habitat. In addition

to off-road activities, one routine helicopter patrol route is flown from Why along a southwesterly route to the Agua Dulce Mountains. Additional helicopter activities may occur throughout the range of the pronghorn, and helicopters may hover and land. Areas where low-level helicopters are used have the highest potential for disturbance to pronghorn. Evidence from other subspecies of pronghorn and other ungulates suggests that pronghorn may exhibit elevated heart rates, may flee, and could alter habitat use in response to low-level helicopter flights (Workman *et al.* 1992).

Yuma Sector Border Patrol Beacon Stations

After initiating emergency consultation, the Yuma Sector Border Patrol installed six emergency beacon stations (panic buttons) on the BMGR as a means to reduce mortality of illegal immigrants. The installation of the stations resulted in little habitat disturbance; however, the presence of the electronic stations may increase human presence in these areas (undocumented immigrants, and maintenance and rescue crews) and therefore represents an additional disturbance factor for pronghorns. To date, the beacon stations have been activated several times. Yuma Sector Border Patrol has requested reinitiation of consultation on their ongoing activities, including the operation and maintenance of these beacons. We expect to complete a biological opinion by the end of September 2003.

Smuggler/Drug Interdiction

We are aware of U.S. Customs, Drug Enforcement Authority, and Arizona Army National Guard smuggler or drug interdiction activities in pronghorn habitat, including vehicle and helicopter activities. However, none of these agencies have provided information to us about the extent or types of activities they conduct, and no consultation has occurred on these activities. National guard helicopter operations continue intermittently in pronghorn habitat. We are aware of low-level helicopter flights as late as June 2003. Due to a lack of information, we cannot evaluate the extent to which these activities may affect Sonoran pronghorn or their habitats. However, vehicles and low-level helicopter flights can cause pronghorn to run, which can have adverse physiological effects, particularly when the animals are stressed, such as during drought (see Effects of the Proposed Action).

Federal Actions Addressed in Section 7 Consultations

As part of our comprehensive discussion of all past and present actions affecting pronghorn within the action area, we describe below all biological opinions issued to date that may affect the pronghorn.

Four opinions addressed projects with minor effects to the pronghorn. Two opinions (consultation numbers 02-21-83-F-0026 and 02-21-88-F-006) covered capture and collaring of pronghorn for research purposes, with no incidental take of pronghorn anticipated. Consultation

number 02-21-88-F-0081 involved installation of a water source in the Mohawk Valley for pronghorn, with no incidental take anticipated. Consultation number 02-21-89-F-008 addressed change in aircraft use by Luke Air Force Base on the BMGR, including change in aircraft type from the F-15A/B to the F-15E, and an increase in nocturnal flights (F-15E Beddown Project). We anticipated take of pronghorn in the form of harassment as a result of aircraft overflights. Reasonable and prudent measures to minimize take included: 1) development of long-term studies to determine the effects of overflights on the pronghorn, 2) if effects of overflights are identified, Luke Air Force Base would work with us to eliminate them, and 3) work involving pronghorn would be carried out in accordance with appropriate state and Federal permits. This project was later incorporated into the biological opinion on Luke Air Force Base' activities on the BMGR, discussed below.

Nine biological opinions evaluated major projects with greater effects to pronghorn:

Border Patrol Activities in the Yuma Sector, Wellton Station, Yuma, Arizona

This biological opinion (consultation number 02-21-96-F-0334), issued September 5, 2000, addressed all Border Patrol activities along the United States/Mexico border in Yuma County from the Colorado River to about the area of Pinta Sands at the south end of the Sierra Pinta Mountains. The Yuma Sector has requested reinitiation of consultation; we expect a revised opinion will be produced by the end of 2003. Border Patrol activities within the Yuma Sector/Wellton Station included helicopter and ground patrols; drag road preparation and assessment of road maintenance; remote sensor installation and maintenance; apprehensions and rescues; and assistance to other sectors and agencies. To reduce adverse effects on pronghorn, the Border Patrol agreed to implement the following measures: 1) purchase new, quieter MD600N helicopters to replace existing OH-06As; 2) contact the Arizona Game and Fish Department weekly for an update on weekend telemetry flights to avoid areas of pronghorn concentration; 3) modify helicopter flights to avoid fawning areas during the three peak months of the fawning season (April-June); 4) make confidential monthly reports to the manager of Cabeza Prieta NWR detailing the law enforcement actions and wildlife observations made during the previous month; 5) finalize the Memorandum of Understanding between the Border Patrol and Cabeza Prieta NWR to address objectives that will minimize potential conflicts including limiting routine patrols and off-road use in wilderness and providing a framework for cooperation; and 6) conduct an annual interagency meeting with Cabeza Prieta NWR, this office, and BLM to present the annual report and discuss ways to improve coordination.

Disturbance to pronghorn was anticipated as a result of on-the-ground Border Patrol operations, and direct injury or mortality of pronghorn as a result of collision with Border Patrol vehicles or by low-level helicopter flights abruptly approaching and startling pronghorn, which may result in injury or energetic stress, particularly during drought. Pronghorn may also be adversely affected by noise and visual impacts of helicopter overflights. The increased energy expenditure caused by sudden or loud noises may lead to lower reproductive output and/or survival. The potential for detrimental effects to pronghorn may be greatest during the peak months of the fawning season (April-June). Habitat disturbance due to off-road vehicle travel would also result. During

reinitiation of this consultation in 2003, we intend to ensure that helicopter flights do not occur over or near the semi-captive breeding facility, which should be completed in late 2003.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. We anticipated take in the form of harassment that is likely to injure up to one pronghorn in 10 years. The following reasonable and prudent measures were provided: 1) minimize injury of pronghorn; 2) monitor and study reactions of pronghorn on BMGR to Border Patrol activities; and 3) provide a means to determine the level of incidental take that results from Border Patrol activities. Several conservation recommendations were also provided.

The Border Patrol submitted an annual report of their activities in 2001, in which they stated that they were in the process of implementing the reasonable and prudent measures, terms and conditions, and conservation recommendations that were part of the proposed action. They have not replaced the OH-06A helicopters with quieter models, as they agreed to during consultation in 2000; however, they are investigating other single turbine helicopters with low noise profiles. We are not aware of any incidental take attributable to Border Patrol activities in the Yuma Sector's Wellton Station resulting from the proposed action.

BLM's Lower Gila South Management Area

Three biological opinions address BLM's Lower Gila South Management Area. The Lower Gila South Resource Management Plan-Goldwater Amendment (consultation number 2-21-90-F-042), proposed specific and general management guidance for non-military activities on the BMGR. Of particular importance for pronghorn was proposed management of recreation. Use of the BMGR is by permit only. The number of BMGR recreational use permits issued by the BLM field offices increased dramatically in the late 1990s, with a total of 893, 2545, and 3528 permits issued in 1998, 1999, and 2000, respectively. Permits are also issued by the USAF, Marine Corps, and Cabeza Prieta NWR. Permits are valid for any part of the BMGR that is open to public recreation. The presence of an increasing number of humans creates a disturbance risk to pronghorns, and OHVs may constitute a mortality factor. The OHV roads and heavily used vehicle-camping areas degrade habitat and may disturb pronghorn, as well as create barriers to pronghorn movement. No incidental take was anticipated. The non-jeopardy biological opinion, issued April 25, 1990, was programmatic, requiring BLM to consult when site-specific projects are proposed. To date, no site-specific formal consultations have been conducted. In November 2001, BLM's management of the range ceased and will be replaced by the BMGR INRMP (see section entitled "Recreation, Natural Resources, and Cultural Resources Management" herein).

The Lower Gila South Habitat Management Plan (HMP) (consultation number 02-21-89-F-0213) provided management guidance for both specific and general actions in southwestern Arizona. Four actions were addressed in the HMP, including an exchange of 640 acres near Ajo, rehabilitation work on two catchments, and assessment of livestock removal from pronghorn habitat. Exchange of land out of public ownership may facilitate development or other uses that would preclude use by pronghorn. No incidental take was anticipated. The non-jeopardy

The biological opinion for the Lower Gila South Resource Management Plan and Amendment (consultation number 02-21-85-F-0069) addressed programmatic management of lands in southwestern Arizona, including livestock grazing, wilderness, cultural resources, fire, minerals and energy, recreation, wildlife management, wood cutting, Areas of Critical Environmental Concern, and other land uses. The biological opinion concluded that OHV restrictions and designations of Areas of Critical Environmental Concern would benefit pronghorn, but wood cutting, recreation, grazing activities, mining, and designation of utility corridors would adversely affect pronghorn. Incidental take of the pronghorn was anticipated, but not quantified. Any decline of forage quality or increase in the amount of fencing was judged to indicate that incidental take had been exceeded. Reasonable and prudent measures and terms and conditions to minimize take included: 1) modifying grazing allotment fences to allow passage of pronghorn, 2) improving habitat conditions for the pronghorn, and 3) minimizing human disturbance. We provided conservation recommendations to monitor pronghorn use of the area, assess pronghorn use at livestock waters, and consolidate lands through land exchanges. The non-jeopardy biological opinion was issued on March 27, 1998. In accordance with the opinion, BLM has monitored livestock grazing, and allotment fences have been modified to allow passage of pronghorn. Enforcement of vehicle and camping regulations has been increased south of Ajo.

In summary, the biological opinions for BLM's Lower Gila South Planning Area anticipated adverse effects to pronghorn and their habitat from livestock grazing, recreation, a land exchange, wood cutting, mining, and designation of utility corridors, resulting in an anticipated unspecified amount of take. We determined that the proposed actions were not likely to jeopardize the continued existence of the pronghorn.

Organ Pipe Cactus National Monument - Widen North Puerto Blanco Road

The biological opinion for the Widen North Puerto Blanco Road project (consultation number 02-21-01-F-0109) addressed impacts to pronghorn from the proposed construction of new recreational infrastructure (although consultation on this project is completed, construction has not yet begun due to concerns about the pronghorn). The project was anticipated in concept in the November 16, 2001, opinion on Organ Pipe Cactus NM's General Management Plan, but it was recognized at the time that project-specific consultation would be needed. The project would widen the first 5.1 miles of North Puerto Blanco Road to allow for two-way travel, construct a vehicle turn-around, construct four interpretive pullouts with educational kiosks, and construct a parking area with picnic tables, a restroom facility, and educational kiosks at the terminus of the two-way segment. North Puerto Blanco Road would be widened from 14 feet to 20 feet, concrete low-water crossings would be installed in washes, and some steeper portions of the road would be paved for safety and erosion control.

The project is expected to result in effects to pronghorn from 11 acres of habitat loss, increased disturbance from recreational activities, and movement barrier effects from increased use of the road and recreational activities. Use of the new two-way road, pullouts, and terminus facility

may curtail the movements of pronghorn into the area, effectively barring the species from a portion of their range. These effects are expected to be offset by Organ Pipe Cactus NM's program of annual road and backcountry closures and by delaying construction until the pronghorn's status has improved. Closing these facilities during the crucial fawning and summer dry seasons should largely eliminate these effects during periods when pronghorn are most likely to be in the monument and need access to these areas.

Organ Pipe Cactus NM proposed the following conservation measures to minimize effects to pronghorn: 1) institute a monitoring program such that any pronghorn detected in Organ Pipe Cactus NM will result in a 5-mile diameter buffer zone around the animal which will be closed to all activity, except for a minimal amount of administrative traffic; 2) limit backcountry permits to areas east of SR 85 and south of North Puerto Blanco Drive from March 15 to July 15; 3) close North Puerto Blanco Drive annually to public use from March 31 to July 15, and close the Bates Well Road and Pozo Nuevo Road to public use from March 15 to July 15; 4) continue to place temporary waters in backcountry areas during the dry season for pronghorn; 5) delay timing of construction of the project until after the fawning and summer dry seasons (March 15-July 15); and 6) delay construction until significant rainfall occurs and most pronghorn move out of Organ Pipe Cactus NM to other areas within their range. We determined that the project was not likely to jeopardize the continued existence of the pronghorn. The non-jeopardy biological opinion was issued October 29, 2002. Based on discussions with Park staff, proposed conservation measures are being implemented.

SR 85 Roadway and Drainage Improvements Project, Organ Pipe Cactus NM

On May 8, 2003, we issued a biological and conference opinion for the roadway and drainage improvements to SR 85 through Organ Pipe Cactus NM. The action agency was Organ Pipe Cactus NM. The project included placement of a pavement overlay on the existing roadway width (26 feet) for the length of the project (MP 80.50 to MP 57.80), as well as overlay at existing intersections with Organ Pipe Cactus NM crossroads and the Port-of-Entry at Lukeville. Also proposed were a 6-foot-wide roadway shoulder to be built up to match the elevation of the new roadway pavement, replacement of existing ford concrete walls at 24 low-water wash crossings, modification at the Organ Pipe Cactus NM Visitor Center that would combine the entrance and exit at the site of the existing exit, as well as the construction of right and left turn lanes and a southbound acceleration lane to serve the new entrance/exit, construction of two interpretive waysides for use by motorists, including visitors to Organ Pipe Cactus NM, construction of a concrete box culvert in Cherioni Wash (MP 70.29) to eliminate the existing dip-crossing, and other roadway improvements associated with these features. Included in the proposed action were a number of conservation measures to minimize effects to listed species. These included: salvage of vegetation and revegetation of 8.27 acres, installation of gates on the two SR 85 waysides so they can be closed to public use during the pronghorn fawning period (March 15 - July 15), vegetation clearing adjacent to SR 85 for visibility, a literature review of pronghorn-road interactions and recommendations for reducing the likelihood of pronghorn road mortality or injury, placement of temporary water sources in key areas at critical times for pronghorn, a monitoring program to assess effectiveness of temporary waters, continuation of

participation in and financial support of the pronghorn emergency recovery projects, an annual report of pronghorn conservation efforts addressing annual progress for each of the measures listed here and in other current biological opinions on the pronghorn, contribution to the 51 recovery projects identified by the Sonoran pronghorn recovery team, timing of construction to avoid the pronghorn breeding season, and coordination with us and the Arizona Game and Fish Department to determine pronghorn presence in the Monument prior to construction. NPS will only begin construction after receiving written authorization from us to proceed, based on pronghorn telemetry or overflight survey information (note - no pronghorn are currently telemetered).

We concluded that the proposed action was not likely to jeopardize the continued existence of the Sonoran pronghorn. No take of pronghorn was anticipated. We included three conservation recommendations for pronghorn. :

5 Remanded Biological Opinions

In response to *Defenders of Wildlife, et. al., v. Bruce Babbitt, et. al.* (Civil Action No. 99-927 [ESH]), Judge Ellen Huvelle of the United States District Court (Court) for the District of Columbia issued a Memorandum Opinion and Order on February 12, 2001. The Court found that we failed to address the impact of various Federal actions on the Sonoran pronghorn when added to the environmental baseline and failed to include in the environmental baseline the impacts of all Federal activities in the area that may affect, directly or indirectly, the pronghorn.

The Court ordered us to produce, in consultation with the defendants, revisions of the following biological opinions: Luke Air Force Base (August 1997), Army National Guard (ARNG) (September 1997), BLM (December 1997), MCAS-Yuma (April 1996), and Organ Pipe Cactus NM (June 1997). The Court further ordered that we, in consultation with the Federal agencies whose biological opinions have been remanded, must reconsider those portions of the opinions that have been found to be contrary to the dictates of the Act. This included the scope of the action area, analysis of the environmental baseline, and analysis of the effects of incidental take in context with a revised environmental baseline. The remanded biological opinions were issued on November 16, 2001. A reinitiated opinion on the BLM's grazing allotments was completed in September 2002. In the following discussion, we describe both the original and remanded/reinitiated opinions for these five consultations.

BLM grazing allotments in the vicinity of Ajo, Arizona

The original biological opinion (consultation number 02-21-94-F-0192), issued December 3, 1997, addressed effects to pronghorn resulting from issuance of grazing permits on five allotments, four of which are located near Ajo and Why (Cameron, Childs, Coyote Flat, and Why allotments); and the fifth near Sentinel (Sentinel allotment). All but portions of allotments east of Highway 85 were considered to be within the current distribution of the Sonoran pronghorn. According to the BLM, livestock use of the five allotments had been relatively low in the previous ten years; however, the effects of stocking the allotments at any level had not been

analyzed. Monitoring of the Coyote Flat and Why allotments had not occurred. The BLM permittees had not fully stocked the Cameron, Why, Sentinel, and Childs allotments for a sustained period of time. The Coyote Flat Allotment had been billed for full stocking. According to the BLM, monitoring data had not shown overutilization of the vegetation or a change in vegetation composition. The BLM estimated that if allotments were stocked at permitted levels, forage utilization rates could approach 40 percent. Preliminary data from the BLM and the Arizona Game and Fish Department showed that there is little dietary overlap between pronghorn and cattle. Because of this, the amount of forage on allotments, and the likely utilization levels, we found that adequate forage for the pronghorn should be available. Maintenance of livestock waters, fences, and other improvements may temporarily disrupt pronghorn activity. Pronghorn may also become entangled in livestock fences.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take of one pronghorn was anticipated to occur in the form of harassment or death due to grazing management activities during the 15-year proposed action. The following reasonable and prudent measures were provided to minimize take of pronghorn: 1) minimize impacts to pronghorn from grazing and 2) minimize habitat loss, degradation, and fragmentation of pronghorn habitat. The opinion included the following conservation recommendations: develop allotment management plans for each allotment and monitor pronghorn use within Cameron, Coyote Flat, Sentinel, and Why allotments.

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. A final biological opinion was issued on November 16, 2001. The Federal action considered in that opinion was the issuance of a 10-year grazing permit on the five allotments. However, because the BLM agreed to finalize their Rangeland Health Allotment Evaluations conducted during 2001, and to then reinitiate consultation regarding the continued grazing of these allotments, the 2001 biological opinion analyzed the effects of the proposed action only for the interim period. In this biological opinion we concluded that grazing activities within the interim period would not jeopardize the continued existence of the Sonoran pronghorn. Further, we concluded that these actions would not result in take of Sonoran pronghorn. The opinion included a number of conservation recommendations, as well.

The BLM reinitiated consultation on the Ajo allotments on April 23, 2002. The proposed action was the reissuance of 10-year grazing permits on the five allotments addressed in previous opinions. The BLM included a number of very comprehensive conservation measures to be implemented according to a prioritized schedule. These measures included: 1) BLM will only authorize ephemeral grazing on the Cameron, Coyote Flats, Childs, and Why allotments in accordance with ephemeral use criteria in their Arizona Rangelands Standards and Guidelines and if both of the following conditions are met: a) In years where ephemeral plant production is geographically limited, ephemeral forage on the Ajo allotments is not an important part of ephemeral forage available to pronghorn, either in terms of forage quality or acreage of greenup, and b) the U.S. pronghorn population must be above 100 and increasing; 2) BLM will implement a forage enhancement project on the Cameron Allotment starting in fiscal year 2004, 3) BLM will develop a "drought policy" for the 5 allotments to more consistently guide

authorization of grazing use in Sonoran pronghorn range when drought situations occur, 4) BLM will install ground-level drinking troughs for use by pronghorn, outside of the corrals, on 3 livestock wells in the Cameron Allotment, 5) During 2004-2006, BLM will install lay-down fences along portions of the southwestern boundaries of the Cameron Allotment to allow unimpeded passage of pronghorn. These portions of the fence will be laid down, beginning on May 1 of each year, with the reinstallation process to begin no sooner than August 31 and to be completed by September 15 of each year, 6) BLM will construct a fence to contain livestock in the northern part of the Cameron Allotment from May 1 to September 15 of each year, 7) BLM will provide this office with full descriptions, including photographs and diagrams, of all existing livestock water sources within the allotments west of SR 85. Based on the results of the study described below in 8, BLM will work with us to determine any necessary modifications to each water source to a) reduce the potential of the source to provide breeding habitat for biting midges (may require restricting access to some sources through fencing or breaching dams and allowing the sources to dry); b) provide safe access for Sonoran pronghorn; and c) ensure that such modifications do not result in adverse effects to other listed species in the vicinity (e.g., cactus ferruginous pygmy-owls may use the more vegetated water sources), and 8) BLM will initiate or cooperate in development of a study of the potential for disease transmission from livestock to pronghorn in the Ajo Allotments.

In the September 30, 2002, opinion, we concluded that the proposed action is not likely to jeopardize the continued existence of the pronghorn. This conclusion was based in part on full and prompt implementation of the conservation measures. To date, BLM has prohibited ephemeral grazing, developed a drought policy, surveyed fence lines, purchased some fencing materials, inventoried water sources west of SR 85, funded a pilot disease study, implemented seasonal route closures, contributed \$15,000 towards survey and monitoring efforts, and made other progress in implementing the conservation measures. BLM's conservation measures would also eliminate any potential for take of pronghorn from the project. Four conservation recommendations were included in the opinion.

Thus far, compliance with the conservation measures has been good. BLM was to submit annual reports to us on implementation of their action, including the conservation measures. The first report was received in March 2003. Consistent with the opinion, a report inventorying all livestock waters on the allotments west of SR 85 (measure 7) was received by us in November 2002, and BLM initiated a study of disease transmission in the Ajo allotments with Arizona Game and Fish Department in 2003 (measure 8).

Marine Corps Air Station-Yuma in the Arizona Portion of the Yuma Training Range Complex

Consultation began on the Arizona portion of the YTRC in 1995. The original biological opinion (consultation number 02-21-95-F-0114), issued on April 17, 1996, addressed all proposed and authorized actions on the BMGR by MCAS-Yuma, including proposed changes to military flights over Cabeza Prieta NWR, ongoing flights over BMGR, and operation of various

training facilities such as landing strips, a rifle range, targets, a parachute drop zone, a transmitter/telemetry system, and ground support areas. MCAS-Yuma conducts WTI courses twice a year (March-April and October-November - see Description of the Proposed Action).

Ground-based activities, such as those of troops and vehicles at ground-support areas were likely to adversely affect pronghorn habitat use. Over the entire project area, ground-support areas in potentially occupied pronghorn habitat would encompass approximately 32.4 mi². Numerous pronghorn have been located in recent years in R-2301W on the BMGR and the Cabeza Prieta NWR east of the Baker Peaks, Copper, and Cabeza Prieta mountains. In this area, ongoing and proposed military ground-based activities have the greatest potential for adversely affecting pronghorn. Military overflights do not cause habitat degradation, but pronghorn may respond with increased heart rates and flee from aircraft, particularly low-level helicopters. The increased energy expenditure associated with flight behavior may lead to lower reproductive output and/or survival. Additionally, pronghorn may avoid flight paths, which may result in an indirect loss of useable habitat. In areas where helicopters fly particularly low and create more noise and greater visual stimuli, disturbance to pronghorn would be expected to be greater. Ordnance delivery may also adversely affect pronghorn. Pronghorn use both the North and South TACs, and ordnance, live fire, and shrapnel could potentially strike and kill or injure a pronghorn. Furthermore, pronghorn could be killed or injured during an encounter with unexploded live ordnance on the ground. MCAS-Yuma proposed measures to reduce the direct and indirect impacts of the proposed action, including measures to reduce or eliminate take of Sonoran pronghorn and to minimize destruction and degradation of habitat.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take of one pronghorn per 10 years was anticipated in the form of direct mortality, and undetermined numbers of pronghorn were anticipated to be taken in the form of harassment by low-level fixed wing and helicopter flights, military vehicles, or other activities authorized, funded, or carried out by MCAS-Yuma. The following reasonable and prudent measures were provided to minimize take of pronghorn: 1) MCAS-Yuma will develop personnel and visitors educational/information programs and operational procedures; 2) to the extent practicable, military activities shall be located outside of pronghorn habitat; and 3) incidental take resulting from the proposed action will be monitored and reported to us. Three conservation recommendations were included in the opinion, as well.

In 1999, MCAS reported that no pronghorn habitat was modified, Range Management received no reports of Sonoran pronghorn encounters, and all air and ground crews were briefed on the requirements of the opinion. We are not aware of any incidental take of pronghorn attributable to MCAS-Yuma YTRC activities. On March 18, 1998, an amendment was requested on the consultation by MCAS-Yuma. This request slightly changed the description of the equipment and personnel to be used in the Stoval Field exercise area. We determined that the changes would have no additional effects not already anticipated in the biological opinion.

The 1996 biological opinion was remanded to us by the Court on February 12, 2001. During consultation, MCAS-Yuma proposed 26 conservation measures aimed at the reduction of adverse effects of the proposed action on the environment, including impacts to the Sonoran pronghorn (Dames and Moore 1995; MCAS -Yuma 1995, 1997, 2001; letter from MCAS-Yuma to us dated October 15, 2001). We concluded that the proposed action would not jeopardize the continued existence of the Sonoran pronghorn. Further, we anticipated that no more than six Sonoran pronghorn would be incidentally taken as a result of the proposed action. The incidental take was expected to be in the form of harassment. This incidental take provision will be reviewed concurrent with subsequent reviews of the BMGR INRMP, which will occur every five years. The following reasonable and prudent measure was provided to minimize take of pronghorn: MCAS-Yuma shall modify low-level helicopter use to avoid areas of significant pronghorn use to minimize adverse effects from helicopters on the pronghorn and its habitat, particularly areas important for fawns and their mothers. The opinion included several conservation recommendations, as well. We issued the final remanded biological opinion on November 16, 2001.

Organ Pipe Cactus NM General Management Plan

The biological opinion (consultation number 02-21-89-F-0078), issued June 26, 1997, addressed implementation of Organ Pipe Cactus NM's GMP. The purpose of the GMP is to guide management for the next 10-15 years. Plan elements included: 1) working with Arizona Department of Transportation to ensure continued travel and commerce on SR 85 while enhancing resource protection, 2) seeking designation of Organ Pipe Cactus NM as the Sonoran Desert National Park, 3) establishment of partnerships to share facilities, staff, and costs in Why and Lukeville, 4) increased wilderness and development of an interagency wilderness and backcountry management plan, 5) changes in trails at Quitobaquito, 6) changes in facilities in the Twin Peaks area, 7) increased primitive camping and designated trails, and 8) full implementation of the Organ Pipe Cactus NM Cultural Resources Management Plan.

To reduce adverse effects on pronghorn, Organ Pipe Cactus NM proposed the following: 1) pursue an agreement with Arizona Department of Transportation to establish a vehicle for continued communication regarding road-related issues, construct underpasses at known movement corridors to facilitate safe passage of pronghorn under the highway, and establish a program to explore other measures to better understand and subsequently reduce the impacts of SR 85 on pronghorn; 2) continue working with the Arizona Department of Public Safety to enforce the existing speed limit within Organ Pipe Cactus NM; 3) convert the bottom strands of Organ Pipe Cactus NM's north and south boundary fences to smooth wire to encourage pronghorn movements between Organ Pipe Cactus NM and surrounding areas; 4) educate motorists about the plight of pronghorn using a variety of interpretive media in an effort to encourage lower speeds and increased awareness of wildlife use of the highway corridor; 5) continue to serve as a member of the Interagency Core Working Group for Sonoran pronghorn recovery and implement activities outlined in the recovery plan, including development of a monitoring program; and 6) monitor visitor use and restrict access where necessary to minimize the potential for disturbance to pronghorn.

Recreational activities at Organ Pipe Cactus NM include hiking, camping, horse-back riding, and biking. These activities can disturb pronghorn and degrade habitat. Maintaining and/or adding hiking trails at Organ Pipe Cactus NM is likely to maintain or increase visitor presence in pronghorn habitat, resulting in disturbance to pronghorns. All proposed facilities would be located within areas of existing development and would involve relatively small tracts of land surrounded by larger areas of undisturbed habitat. However, development of facilities that result in increased visitor use may adversely affect the pronghorn. Increased use of some frontcountry and backcountry areas has the potential to adversely affect pronghorn if it causes an alteration in behavior or habitat use. Increased visitation to Organ Pipe Cactus NM was also expected to result in increased traffic along SR 85, adding to the barrier effect of existing traffic patterns. Approximately 22 miles of SR 85 lie within Organ Pipe Cactus NM. We concluded that the highway is a deterrent to expanding pronghorn populations, and resulting modified behavioral patterns may lead to a reduction in genetic exchange and viability, and therefore a reduction in the ability of pronghorn to adapt to environmental change.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take in the form of injury or death to one pronghorn associated with traffic on SR 85 was anticipated. The following reasonable and prudent measures were provided to minimize take of pronghorn: 1) work with agencies to implement actions to reduce effects of current and future traffic patterns on SR 85; 2) modify fences for pronghorns; 3) educate motorists on pronghorn vulnerability to traffic; and 4) monitor use and restrict access where necessary to minimize pronghorn disturbance. One conservation recommendation was included in the opinion. No incidental take of pronghorn associated with the proposed action has been documented.

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. The GMP had changed since the 1997 plan was released, most notably with regard to projects that were ongoing or had been completed, and the addition of new projects. To reduce adverse effects, Organ Pipe Cactus NM included 14 conservation measures for Sonoran pronghorn in its proposed action: 1) closing Pozo Nuevo Road to public use at its intersection with Puerto Blanco Drive from March 15 to July 15; 2) closing Bates Well Road to public use at the northern monument boundary from March 15 to July 15; 3) closing North Puerto Blanco Drive at a point approximately 5.1 miles from the Visitor's Center, and also at its intersection with Pozo Nuevo Road from April 1 to July 15; 4) implementing a pronghorn monitoring program and closing areas within a 5 mile diameter of known pronghorn locations, specifically targeting Puerto Blanco Road for potential closure between March 1 and March 31; 5) restricting backcountry use, from March 15 to July 15, to areas east of SR 85 and south of North Puerto Blanco Drive; 6) limiting future development to the area south of North Puerto Blanco Drive and east of Senita Basin Road/Baker Mine Trail/Dripping Springs Mine Trail and limiting timing of construction to occur outside the pronghorn fawning and summer dry seasons (March 15 to July 15); 7) establishing a 3-year experimental pronghorn crossing zone on SR 85 from milepost 67 to 71, consisting of a temporary speed limit reduction to 35 - 45 mph from 0400 - 0900 hours seasonally, including a monitoring program to assess effectiveness; 8) removing the north

boundary fence if BLM agrees to remove livestock from the Cameron and Coyote Flat allotments for a period of at least 20 years, including at least a 2 year advance notice of BLM's intention to return livestock to these areas; 9) placing temporary water sources in key areas, primarily during the dry season, and including a monitoring program to assess effectiveness of temporary waters; 10) continuing to support pronghorn radiotelemetry (if animals are again, radiotelemetered); 11) implementing erosion control measures utilizing a hydrologist/sedimentologist; 12) maintaining and expanding a non-native species removal program including removal of buffleggrass and Sahara mustard; 13) providing an annual report of pronghorn conservation efforts; and 14) contributing to the 51 recovery projects identified by the Sonoran pronghorn recovery team (Appendix 1 of the 2001 opinion) within NPS regulations, either by providing in-kind contributions or by commitment of funds. Consequently, we did not anticipate any incidental take of Sonoran pronghorn as a result of the proposed action. A number of conservation recommendations were included in the opinion.

The November 16, 2001, opinion was remanded for further revision to us by court order, dated January 7, 2003. The April 7, 2003, opinion came to the same conclusion on the pronghorn as the November 2001, opinion (i.e., the proposed action was not likely to jeopardize the continued existence of the pronghorn, and no incidental take of pronghorn was anticipated). Organ Pipe Cactus NM made some changes in the conservation measures after finalization of the opinion. An addendum to the opinion was issued by this office on June 11, 2003, clarifying the changes and stating that they did not alter our previous findings in the April 7, 2003, opinion.

Luke Air Force Base Use of Ground-Surface and Airspace for Military Training on the BMGR

The biological opinion (consultation number 02-21-96-F-0094), issued August 27, 1997, addressed military use of the airspace above and the ground space on BMGR-East by Luke Air Force Base. At the time of the consultation, about two-thirds of the BMGR was located on lands managed by the DoD and BLM, with the remaining third located within Cabeza Prieta NWR. Approximately 5 percent (7.6 percent, if not including Cabeza Prieta NWR) of the range had been impacted by military activities. Military activities within the area of overlap with the Cabeza Prieta NWR were limited to use of airspace and operation of four Air Combat Maneuvering Instrumentation sites. Military activities occurring within BMGR-East were managed by Luke Air Force Base and include: airspace use, four manned air-to-ground ranges, three tactical air-to-ground target areas, four auxiliary airfields, Stoval Airfield, and explosive ordnance disposal/burn areas. Primary potential effects of the action included habitat loss due to ground-based activities, harassment and possible mortality of pronghorn at target areas, and disturbance of pronghorn due to military overflights.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. During each 10-year period of the project, take was anticipated in the form of harassment that was likely to injure up to two pronghorn and in the form of death of at least one pronghorn. The following reasonable and prudent measures were provided to minimize take: 1) minimize impacts of activities on pronghorn; 2) minimize habitat loss, degradation, and fragmentation of pronghorn habitat; 3) monitor and study reactions of pronghorn on the BMGR

to military activities; and 4) determine the level of incidental take that results from the project. Three conservation recommendations were provided in the opinion.

Implementation of the reasonable and prudent measures have been documented in their annual reports. We are not aware of any take of pronghorn confirmed attributable to Luke Air Force Base use of the ground-surface and airspace on the BMGR. A pronghorn found dead near a target may have been strafed, but it may also have died from other causes (see "Effects of the Proposed Action" herein for a full discussion of this incident).

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. During the development of revised opinion, Luke Air Force Base made substantial commitments to minimize the effects of their activities on the Sonoran pronghorn, and additionally committed to implementing a variety of recovery projects recommended by the Sonoran Pronghorn Recovery Team. A total of 12 conservation measures were added to the proposed action. In a November 16, 2001, biological opinion, we concluded that the proposed action, including conservation measures, is not likely to jeopardize the continued existence of the Sonoran pronghorn. We further anticipated that no more than three Sonoran pronghorn would be incidentally taken as a result of the proposed action. The incidental take was expected to be one pronghorn in the form of death and two pronghorn in the form of harassment. The incidental take provision will be reviewed concurrent with subsequent reviews of the BMGR INRMP, which will occur every five years. To minimize impacts to Sonoran pronghorn, we provided the following reasonable and prudent measure: Luke Air Force Base shall expand efforts to monitor Sonoran pronghorn on the tactical ranges to minimize the likelihood of adverse impacts to the pronghorn from military training exercises. Additionally, several conservation recommendations were suggested

In the November 16, 2001, biological opinion, one term and condition was provided to implement the reasonable and prudent measure described above. Luke Air Force Base has since completed this term and condition by updating the range operating instructions to reflect the conservation measures in the proposed action. Luke Air Force Base also continues to support the recovery of the Sonoran pronghorn through the biological monitoring contract and management of their previously obligated funds. Also in the opinion, we discussed a number of conservation measures that Luke Air Force Base agreed to add to their proposed action. During FY 2002, Luke Air Force Base did not budget further funds for Sonoran pronghorn management; however, they are assisting Arizona Game and Fish Department in managing the currently obligated funds.

The opinion was remanded again in 2003. A revised opinion is being prepared and is due August 6, 2003.

Western Army National Guard Aviation Training Site Expansion Project

The non-jeopardy biological opinion for WAATS (consultation number 02-21-92-F-0227) was issued on September 19, 1997. The purpose of WAATS is to provide a highly specialized environment to train ARNG personnel in directed individual aviator qualification training in attack helicopters. The WAATS expansion project includes: 1) expansion of the existing

Tactical Flight Training Area, which includes establishing four Level III touchdown sites, 2) development of the Master Construction Plan at the Silver Bell Army Heliport, and 3) establishment of a helicopter aerial gunnery range for use by the ARNG on East TAC of the BMGR. East TAC is outside the current range of the pronghorn.

This 1997 biological opinion did not address the pronghorn, but, in the Court's opinion, should have and was therefore remanded by the Court. Per the final EIS for WAATS, ARNG use of East TAC did not cause existing training to shift to North or South TACs because Luke Air Force Base eliminated F-15E training at BMGR, concentrating on F-16 air-to-air and air-to-ground training. Therefore, the EIS did not consider impacts to the pronghorn and none were anticipated. All activities that are part of the proposed action occur outside the current range of the pronghorn, with the exception of training at North TAC. Training at North TAC only occurs when East TAC is closed for annual maintenance and EOD clearances (4-6 weeks each year). Effects to pronghorn at North TAC are minimized by monitoring protocols established by Luke Air Force Base. Training at East TAC could preclude recovery of historical habitat if the many other barriers that prevent pronghorn use of East TAC were removed.

The final remanded biological opinion, issued November 16, 2001, found that the proposed action was not likely to jeopardize the continued existence of the Sonoran pronghorn. No incidental take was anticipated. The proposed action included eight conservation measures aimed at the reduction of adverse effects to Sonoran pronghorn and its habitat. The proposed measures minimized, but did not eliminate, habitat disturbance from the ARNG that would occur on North TAC. The WAATS opinion was remanded by the court in 2003 with the MCAS-Yuma, Organ Pipe Cactus NM General Management Plan, and the Luke Air Force Base opinion. A revised opinion is being prepared and is due August 6, 2003.

F. Summary of Activities Affecting Sonoran Pronghorn in the Action Area

Historically, livestock grazing, hunting or poaching, and development along the Gila River and Rio Sonoyta were all probably important factors in the well-documented Sonoran pronghorn range reduction and apparent population decline that occurred early in the 20th century. Historical accounts and population estimates suggest pronghorn were never abundant in the 20th century, but recently, the estimated size of the population in the action area declined from 179 (1992) to 21 (December 2002). At 21, genetic diversity is expected to erode, and the sub-population is in imminent danger of extirpation due to human-caused impacts, or natural processes, such as predation or continued drought. Although the proximate cause of the decline during 2002 was drought, human activities limit habitat use options by pronghorn and increase the effects of drought on the sub-population. The U.S. pronghorn sub-population is isolated from other sub-populations in Sonora by a highway and the U.S./Mexico boundary fence, and access to the greenbelts of the Gila River and Rio Sonoyta, which likely were important sources of water and forage during drought periods, has been severed.

Within its remaining range, the pronghorn is subjected to a variety of human activities that disturb the pronghorn and its habitat, including military training, increasing recreational activities, grazing, increasing presence of undocumented immigrants and smugglers, and in

response, increased law enforcement activities. MCAS-Yuma (2001) quantified the extent of the current pronghorn range that is affected by various activities and found the following: recreation covers 69.6 percent of the range, military training on North and South TACs covers 9.8 percent, active air-to-air firing range covers 5.8 percent, proposed EOD five-year clearance areas at North and South TACs and Manned Range 1 cover 1.0 percent, and MCAS-Yuma proposed ground support areas and zones cover 0.29 percent. In addition, livestock grazing occurs over 5.6 percent of the pronghorn's current range (NPS 2001, Bright *et al.* 2001); a total of 860 miles of roads occur in the current range (MCAS-Yuma 2001)(2,222 miles of roads exist within the BMGR, of which on BMGR-West 368 miles are within the current range of the pronghorn and 464 miles are within the historical range - URS Corporation 2003), and foot and vehicle traffic by undocumented immigrants and smugglers occurs at an increasing frequency throughout the area. NPS (2001) identified 165 human activities in the range of the pronghorn, of which 112 were adverse, 27 were beneficial, 26 had both adverse and beneficial effects, and 4 had unknown effects. NPS (2001) concluded that in regard to the pronghorn, "while many projects have negligible impacts on their own, the sheer number of these actions is likely to have major adverse impacts in aggregate."

The current range of the pronghorn in the U.S. is almost entirely comprised of lands under Federal jurisdiction; thus authorized activities that currently affect the pronghorn in the action area are almost all Federal actions. However, illegal, unauthorized foot traffic and off-road vehicle activity have been and continue to be significant non-Federal threats to the pronghorn and its habitat. Prior to November 2001, in seven of 12 biological opinions issued by FWS that analyzed impacts to the pronghorn, we anticipated that take would occur. In total, we anticipated take of five pronghorn in the form of direct mortality every 10-15 years, and an undetermined amount of take in the form of harassment. Given the small and declining population of pronghorn in the U.S. at the time the opinions were written, take at the levels anticipated in the biological opinions would constitute a substantial impact to the population.

Changes made in the remanded biological opinions in 2001 and 2003, plus the findings in other recent opinions, reduced the amount or extent of incidental take anticipated to occur from Federal actions. In the November 16, 2001, opinion, we found that take would occur in 5 of 13 (the original 12 opinions plus the ARNG opinion that now considers effects on the pronghorn) biological opinions issued up to that point for the Sonoran pronghorn. We now only anticipate take of pronghorn in three opinions: 1) Border Patrol activities in the Yuma Sector, for which incidental take of one pronghorn in the form of harassment was anticipated in 10 years, 2) the Lower Gila South Resource Management Plan and Amendment, in which an undetermined number of pronghorn were anticipated to be taken, and 3) Luke Air Force Base F-15E Beddown Project. However, we believe that conservation measures agreed to by BLM in the 2002 Ajo allotment grazing opinion largely minimizes or eliminates incidental take resulting from the Lower Gila South Resource Management Plan and Amendment. The Luke Air Force Base's F-15 Beddown Project is subsumed into Luke's August 6, 2003, opinion, in which no take is anticipated. *Note to reader - these statements are consistent with draft Luke BO, however,*

conclusions could change in the final opinion. This amount of take is much less than that anticipated in 2001 because we have worked together with the Federal action agencies to minimize the effects of ongoing and proposed activities on the Sonoran pronghorn. In addition, at about 21 animals in the U.S. sub-population, the likelihood of take due to Yuma Sector Border Patrol or BLM activities is now much less than we had anticipated when those opinions were written, because the pronghorn population is much smaller, greatly reducing the likelihood of interactions between pronghorn and these Federal activities (although the effect of any take on the viability of the U.S. sub-population is now much greater, due to small population size). With the exception of likely capture-related deaths during telemetry studies, we are unaware of any confirmed incidental take resulting from the Federal actions described here.

We believe the aggregate effects of limitations or barriers to movement of pronghorn and continuing stressors, including habitat degradation and disturbance within the pronghorn's current range resulting from a myriad of human activities, exacerbated by periodic dry seasons or years, are responsible for the present precarious status of the Sonoran pronghorn in the action area.

EFFECTS OF THE PROPOSED ACTION

Effects to pronghorn from the proposed action may result from habitat disturbance, barriers to movement, and visual and auditory disturbance. The proposed conservation measures will substantially minimize these effects on the Monument. In addition, the vehicle barrier will likely have long-term beneficial effects to pronghorn on the Monument if it is successful in reducing the number of illegal vehicles that currently cross into the pronghorn range from Mexico. However, habitat damage and disturbance of pronghorn will likely increase on Cabeza Prieta NWR as vehicles are redirected to the west.

Current estimates are that the proposed project would result in the disturbance of approximately 70 acres (28.5 ha) of habitat, almost half of which is east of Highway 85. All acreage to be impacted is immediately adjacent to the international border. Radiotelemetry data gathered by AGFD, and biennial Sonoran pronghorn surveys, indicate this area is seldom used by Sonoran pronghorn. Approximately half of the project length is immediately adjacent to Mexico Highway 2, a busy highway that pronghorn are unlikely to approach. Therefore, the area to be impacted by this project is very unlikely to be used by Sonoran pronghorn as habitat. Furthermore, this acreage appears very small in the context of the approximately 2 million acres (809,814 ha) of potentially suitable habitat available to the U.S. population of Sonoran pronghorn. The 70 acres of newly-disturbed ground will be susceptible to colonization by invasive exotic plants such as buffelgrass (*Pennisetum ciliare*).

The proposed project is likely to facilitate the restoration and recovery of habitat that has been damaged by illegal off-road driving. Of the illegal roads illustrated in Figure 1, the great majority are west of Highway 85 in Sonoran pronghorn habitat. The proposed vehicle barrier should eliminate or greatly reduce use of these roads, resulting in the eventual restoration of approximately 132 miles of illegal roads. Assuming an average width of approximately 8 feet,

this equates to restoration of approximately 128 acres. In addition to this habitat restoration, the proposed project will prevent future habitat degradation of this type.

The proposed project directly overlays an existing barrier to Sonoran pronghorn movement. Currently, pronghorn appear not to cross the international boundary. This is believed to be due to the combined barrier effects of: (1) the international-boundary livestock fence; (2) Mexican Highway 2; (3) right-of-way fencing and livestock fencing that is intermittent along Highway 2 between Sonoyta and San Luis; and (4) human settlements and activity concentrations, which are expanding linearly along the boundary, both east and west of Sonoyta. The proposed vehicle barrier will replace the livestock fence in some areas, while in others the existing livestock fence will remain, several feet south of the vehicle barrier. At this time, it has not been determined in which areas the livestock fencing will remain. The horizontal member of the vehicle barrier would be set at 36". The recommended height of the lower strand of wire for a pronghorn-passable fence is 18" to 20". Although the horizontal member of the barrier fence will be railroad rail, much heavier than fence wire, it is believed that by being 16" higher than the recommended height for a pronghorn fence the vehicle barrier will be less of a physical barrier than a pronghorn-friendly wire fence. This would appear to be a moot question however, considering the strong evidence that the international border is already a barrier to pronghorn movement. In some areas, the vehicle barrier may be used to anchor wire fencing to exclude livestock. In these areas, the only wire below the horizontal railroad rail would be a smooth wire, set no less than 18 in above ground.

Construction and maintenance activities will likely result in little disturbance for Sonoran pronghorn. Where the project is located east of Highway 85, it is highly unlikely that Sonoran pronghorn will be in the project vicinity at all, either in the U.S. or Mexico. West of Highway 85, activities will take place an average of approximately 100 m north of Mexico Highway 2. This highway and associated truck stops, military checkpoints, residences, and other businesses already constitute a 24-hour, noisy, busy region of human activity. While construction and maintenance actions will increase this activity level by a small increment, the effect already exists, at a scale greater than the proposed project, and due to activities that are not under the control of the NPS.

Vehicle traffic is disturbing to pronghorn and will often cause flight or startle responses with associated adverse physiological changes. Hughes and Smith (1990) found that pronghorn immediately ran 1,310-1,650 feet from a vehicle. Krausman et al. (2001) found that Sonoran pronghorn reacted to ground disturbances (vehicles or people on foot) with a change in behavior 37 percent of the time, resulting in the animals running or trotting away 2.6 percent of the time. Wright and deVos (1986) noted that Sonoran pronghorn exhibit "a heightened response to human traffic" as compared to other subspecies of pronghorn. Disturbance and flight of ungulates are known to result in a variety of physiological effects that are adverse, including elevated metabolism, lowered body weight, reduced fetus survival, and withdrawal from suitable habitat (Geist 1971, Harlow et al. 1987), which may be exacerbated in harsh environments such as those occupied by Sonoran pronghorn. Disturbance may also lead to mortality, including increased vulnerability to predator attack and susceptibility to heat stress and malnutrition. Up to 1000

people per day enter the United States illegally through Organ Pipe Cactus NM in recent years. As illustrated in Figure 1, many of the travel routes for this influx traverse Sonoran pronghorn habitat. The peak period for much of this travel is February-May, the fawning season, when pronghorn are moving eastward toward and into the Organ Pipe Cactus NM. While the vehicle barrier may not substantially reduce illegal foot traffic, it will reduce or eliminate illegal vehicular traffic on the Monument at this sensitive time of year. Therefore, the proposed project should substantially reduce disturbance of Sonoran pronghorn on the Monument.

The vehicle barrier is likely to benefit pronghorn that use the Monument by reducing the number of illegal vehicles that currently cross the pronghorn range on the Monument. Such a reduction would also reduce the frequency of law enforcement pursuits through this area. Although illegal crossings and associated law enforcement are anticipated to decrease along the Monument's boundary, these same activities will likely increase at the eastern and western boundaries of the barrier. As smugglers and other illegals encounter the barrier, they will likely be diverted around the ends of the barrier into Tohono O'odham Nation lands to the east and into the Cabeza Prieta NWR to the west. Cabeza Prieta NWR is key to the survival and recovery of the U.S. sub-population. Redirecting vehicle traffic to the west will likely increase traffic on the illegal routes at Los Vidrios and Davidson Canyon, and may result in creation of new routes just west of the end of the barrier. Vehicles that cross in this area often travel north through the San Cristobal, Growler, and Childs valleys, all of which are important pronghorn use areas. Some of the traffic is likely to be redirected north through Charlie Bell pass into the Childs Valley where the first forage enhancement plot is now operating and the semi-captive breeding facility is planned. Increased disturbance in this area could reduce the effectiveness of these crucial emergency recovery actions. On the other hand, if traffic is redirected to the east into the Tohono O'odham Nation, pronghorn could benefit, because they no longer occur on the Nation. The Border Patrol has also recently stepped up enforcement in the Los Vidrios area, which may push vehicle traffic to the east, rather than into Cabeza Prieta NWR. Until the barrier is constructed and we have experience with how it affects vehicle traffic, it is not possible to predict whether illegal crossings through the current range of the pronghorn will be reduced or simply redirected to Cabeza Prieta NWR. Where Border Patrol directs its enforcement activity once the barrier is in place will also influence how pronghorn will be affected. We are currently in consultation with the Tucson Sector of the Border Patrol and through that process we will be encouraging them to direct their activities in a way that will reduce effects of illegal activities and subsequent enforcement activities on the pronghorn and its habitat.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Relatively small parcels of private and State lands occur within the currently occupied range of the pronghorn near Ajo and Why, north of the BMGR from Dateland to Highway 85, and from

the Mohawk Mountains to near Tacna. State inholdings in the BMGR were recently acquired by the USAF. Continuing rural and agricultural development, recreation, vehicle use, grazing, and other activities on private and State lands adversely affect pronghorn and their habitat. MCAS-Yuma (2001) reports that 2,884 acres have been converted to agriculture near Sentinel and Tacna. These activities on State and private lands and along the Mexican border and the effects of these activities are expected to continue into the foreseeable future. Historical habitat and potential recovery areas currently outside of the current range are also expected to be affected by these same activities on lands in and near the action area in the vicinity of Ajo, Why, and Yuma.

Of particular concern are increasing illegal border crossings by undocumented migrants and smugglers. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station increased steadily from 9,150 in 1996 to 20,340 in 2000. In 2001, estimates of undocumented migrants traffic reached 1,000 per night in Organ Pipe Cactus NM alone (NPS 2001). Increased presence of the Border Patrol in the Douglas, Arizona area, and in San Diego (Operation Gatekeeper) and southeastern California, have pushed undocumented migrant traffic into remote desert areas, such as Cabeza Prieta NWR, Organ Pipe Cactus NM, and BMGR (Klein 2000). Illegal activities result in habitat damage in the form of new roads, discarded trash, cutting of firewood, and illegal campfires with increased chance of wildfire (NPS 2001), and likely result in disturbance of pronghorn. These activities are expected to continue into the future.

CONCLUSION

After reviewing the current status of the Sonoran pronghorn, the environmental baseline for the action area, the effects of the proposed and ongoing NPS action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Sonoran pronghorn. No critical habitat has been designated for this species, therefore, none will be affected. In making our determination, we considered the following:

1. The status of two of the three sub-populations of Sonoran pronghorn are in decline and in serious danger of extirpation. The U.S. sub-population is estimated at 21 animals (18-33, 95 percent confidence interval), while the Pinacate sub-population is estimated at 25. At these levels, population viability is low and genetic variability is expected to erode. The southernmost sub-population, southeast of Mexico Highway 8, also declined from 2000-2002, but at an estimated 255 animals, it is not in immediate danger of extirpation.
2. The rate of decline in the U.S. sub-population from 2000-2002 (79 percent) was much greater than that observed in either the sub-population southeast of Highway 8 (18 percent decline) or the El Pinacate sub-population (26 percent) during the same period. The high level of human activities and disturbance on the U.S. side, particularly in regard to undocumented migrant traffic, smugglers, and law enforcement response, as compared to what occurs in the El Pinacate area, is a likely contributing factor in the difference in rate of decline observed north and south of the border. To the extent that the proposed action reduce illegal border crossings and associated enforcement activities, there may be a beneficial effect.
3. While drought was the proximate cause of the Sonoran pronghorn's decline during 2002, the

high level of human activities and disturbance on the U.S. side has exacerbated the effects of drought. Increasing undocumented migrant traffic, smuggling and associated law enforcement response are of particular concern.

4. Emergency recovery actions have been initiated in an attempt to reverse the recent declines in the status of the U.S. sub-population. A semi-captive breeding facility will be completed this summer in which pronghorn will be housed in a predator-free environment with abundant forage and water. It is hoped that pronghorn will successfully reproduce in the facility and provide animals to bolster the wild population. A forage enhancement plot will be created inside the facility, and another in the same area is currently in operation. These will provide green forage for pronghorn during times of drought. Water sources are also being developed. These water sources and forage enhancement plots are expected to buffer the effects of drought, which have been the proximate cause of recent population declines.
5. This U.S. population of pronghorn is subjected to a myriad of human activities that cause a variety of adverse effects to habitat and disturbance to pronghorn. Activities include, but are not limited to: livestock grazing (with concomitant increased risk of disease), recreation, military and other overflights, ground-based military activities, live ordnance delivery at military targets, and an increasing influx of undocumented migrants and smugglers and corresponding response from the U.S. Border Patrol and other law enforcement agencies. The range of the U.S. pronghorn sub-population is limited by highways, fences, canals, and towns that act a physical barriers to pronghorn movement and prevent them from accessing foraging areas and, during drought, greenbelts such as the Gila River and Rio Sonoyta.
6. Adverse effects to the U.S sub-population from the proposed action include habitat disturbance (although the acreages are very small compared to available habitat within the current range of the pronghorn), a low threat of pronghorn being disturbed by installing and maintaining the barrier, and the likelihood that vehicle traffic will be redirected onto Cabeza Prieta NWR through important pronghorn habitat.
7. NPS has proposed conservation measures that significantly reduce the effects of the proposed action on the Sonoran pronghorn by:
 - a. Salvaging some vegetation and collecting seed, and rehabilitating most staging areas and access roads not being permanently maintained for barrier access.
 - b. Surveying for and controlling invasive plants in the project area.
 - c. Placing temporary water sources in key areas, primarily during the dry season, and including a monitoring program to assess effectiveness of temporary waters (in coordination with the pronghorn recovery team).
 - d. Continuing participation in and financial support of the pronghorn emergency recovery projects, in coordination with the pronghorn recovery team.
 - e. Providing an annual report of pronghorn conservation efforts addressing annual progress for each of the measures listed here and in other current biological opinions on the pronghorn.

- f. Contributing to the 51 recovery projects identified by the pronghorn recovery team within NPS regulations, either by providing in-kind contributions or by commitment of funds.
8. We will work with the Border Patrol through the consultation process to ensure that potential redirection of vehicle traffic through pronghorn habitat on Cabeza Prieta NWR is minimized.
9. The likelihood of pronghorn crossing the international boundary with Mexico **in the project area** is currently very low because of current physical barriers and human activities. Therefore, the presence of the vehicle barrier is unlikely to result in additional barriers to pronghorn movement across the international boundary
10. The physical presence of the vehicle barrier will substantially reduce illegal vehicle access onto NPS lands, thus reducing the impacts of vehicle use on pronghorn habitat on NPS land.

Our conclusion that the proposed action is not likely to jeopardize the continued existence of the Sonoran pronghorn is based on our analysis of the status of the pronghorn rangewide, the environmental baseline, the effects of the proposed action, and the cumulative effects. To summarize from the “Status of the Species”, the status of the pronghorn rangewide is poor, with sub-populations in the Pinacate Region of Sonora and in the United States being most threatened. Fragmentation of populations, loss of historical habitats, disease, and human-caused degradation of remaining habitats, and disturbance of pronghorn are the most important causes of poor rangewide status. As discussed in the “Environmental Baseline”, within the action area, we believe the aggregate effects of limitations or barriers to movement of pronghorn and continuing stressors, including habitat degradation and disturbance within the pronghorn’s current range resulting from a myriad of human activities and disease exposure from those activities, combined with periodic dry seasons or years, are responsible for the present precarious status of the Sonoran pronghorn in the U.S. The proximate cause of the dramatic decline of the U.S. sub-population of pronghorn during 2000-2002 is drought, but the decline was undoubtedly exacerbated by the human-induced degradation of their habitat and human-created barriers, which restrict their movement. Cumulative effects, particularly illegal crossings of the border and travel through pronghorn habitat by smugglers and undocumented immigrants, add additional significant stressors to pronghorn populations.

At the current time, the Sonoran pronghorn population is declining. However, the high fawn to doe ratio experienced in 2001 when rainfall was abundant and timed well for forage production provides evidence of the reversible nature of the current decline. The potential for the U.S. sub-population to rebound will be enhanced by the emergency recovery actions, such as forage enhancement plots, water developments, and the semi-captive breeding facility. NPS will substantially mitigate its contribution to future declines of the pronghorn through prompt and full implementation of their conservation measures. We also intend to work with the Border Patrol to address effects of potentially redirecting illegal traffic through Cabeza Prieta NWR. Thus, although the status of the pronghorn is clearly perilous, the effects of the proposed action, which include effects of conservation measures, do not significantly contribute to this perilous status. When added to the environmental baseline, and cumulative effects, the effects of the proposed action, which includes significant conservation measures, do not reduce appreciably the likelihood of survival and recovery of the Sonoran pronghorn in the wild. Therefore, the NPS

action, with modifications and conservation measures, will not jeopardize the continued existence of the subspecies. Concerns about habitat loss and disturbance caused by construction are minimized by NPS's conservation measures. In determining that the proposed action is not likely to jeopardize the continued existence of the pronghorn, we assume that the conservation measures will be implemented fully and promptly and we will be successful in working with the Border Patrol on any potential redirecting of illegal traffic to Cabeza Prieta NWR.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount or Extent of Take Anticipated

With implementation of the proposed action, including the conservation measures, we do not anticipate take of Sonoran pronghorn as a result of the proposed action.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend implementing the following actions:

1. In addition to rehabilitation of some of the areas disturbed by the action, rehabilitate areas that have been impacted by the illegal traffic (including using some of the transplanted cactus).
2. Continue to fund and support basic research, inventory, and monitoring of the Sonoran pronghorn. NPS should fund or staff recovery projects.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

LESSER LONG-NOSED BAT (*Leptonycteris curasoae yerbabuena*)

STATUS OF THE SPECIES

A. Species Description

The lesser long-nosed bat is a medium-sized, leaf-nosed bat. It has a long muzzle and a long tongue, and is capable of hover flight. These features are adaptations to feeding on nectar from the flowers of columnar cacti, such as the saguaro and organ pipe cactus, and from paniculate agaves, such as Palmer's agave (*Agave palmeri*), and Parry's agave (*A. parryi* Hoffmeister 1986), *A. desertii* (Engelman 1875), and *A. schotti* (Engelman 1875). Palmer's agave exhibits many characteristics of chiropterophily, such as nocturnal pollen dehiscence and nectar production, light colored and erect flowers, strong floral order, and high levels of pollen protein with relatively low levels of nectar sugar concentrations (Slauson 1996). Parry's agave demonstrates many (though not all) of these same morphological features (Gentry 1982).

The lesser long-nosed bat was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in 1988 (U.S. Fish and Wildlife Service 1988). No critical habitat has been designated for this species. A recovery plan was completed in 1994 (U.S. Fish and Wildlife Service 1995). Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. The recovery plan states that the species will be considered for delisting when three major maternity roosts and two post-maternity roosts in the United States, and three maternity roosts in Mexico have remained stable or increased in size for at least five years.

B. Distribution and Life History

The lesser long-nosed bat is migratory and found throughout its historical range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. It has been recorded in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Peloncillo Mountains (Cochise County), and south to the international boundary. Roosts in Arizona are occupied from late April to September (Cockrum and Petryszyn 1991) and on occasion, as late as November (Sidner 1999, 2000); the bat has only rarely been recorded outside of this time period in Arizona (U. S. Fish and Wildlife Service 1995, Hoffmeister 1986, Sidner and Houser 1990). In spring, adult females, most of which are pregnant, arrive in Arizona gathering into maternity colonies. These roosts are typically at low elevations near concentrations of flowering columnar cacti. After the young are weaned these colonies disband in July and August; some females and young

move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Adult males typically occupy separate roosts forming bachelor colonies. Males are known mostly from the Chiricahua Mountains and recently the Galiuro Mountains (T. Snow pers. comm. 1999) but also occur with adult females and young of the year at maternity sites (U. S. Fish and Wildlife Service 1995). Throughout the night between foraging bouts both sexes will rest in temporary night roosts (Hoffmeister 1986).

The primary food source for the lesser long-nosed bat in southeastern Arizona from mid-summer through fall is Palmer's agave, which typically occurs on rocky slopes or hill tops, scattered within the desert grassland and oak woodland communities within the elevational range of 3,000-6,000 ft (Gentry 1982). Parry's agave reaches higher elevations than Palmer's, extending from grasslands into oak woodland, chaparral, pine/oak forests, and mixed conifer with an elevational range of approximately 4,900-8,200 ft (Gentry 1982). Like Palmers' agave, Parry's is typically found on rocky slopes (Gentry 1982). Concentrations of paniculate agaves are generally found on the rocky, shallow soils of hills and ridges. Palmer's and Parry's agaves are also found scattered in areas of deep, heavy soils within grasslands or where there may be thick stands of shrubs, mesquite, oak, and other trees.

The ecology of Palmer's agave is poorly understood, especially as it is affected by livestock use and fire (Slauson, pers. comm., 1997; Wendy Hodgson, Desert Botanical Gardens, Phoenix, pers. comm., 1997). Agaves are perennial succulents. Agave seeds germinate readily with adequate moisture, typically in open areas with limited competition from other plants (Tony Burgess, Biosphere Two Center, Tucson, pers. comm., 1997). Palmer's agave is relatively slow growing, often taking 20 or more years before initiating the single reproductive event in its life (Slauson 1996, 1999). A flowering stalk erupts from the rosette of a mature plant, growing rapidly through the spring and early summer. During the summer 8 to 12 flowering panicles are displayed on the upper third of a stalk 10-16 feet tall (Gentry 1982). Slauson (1996, 1999) has completed a pollination ecology study of Palmer's agave, finding that many pollinator species contribute to establishing seed set. Lesser long-nosed bats have been recorded visiting individual blooming Palmer's agaves more than 1,000 visits per night (R. Sidner, Tucson, pers. comm., 1997; Petryszyn, pers. comm., 1999), while they may not visit other agaves at all (Slauson, pers. comm., 1997). Bat visits generally last less than one second (Slauson 1999). Apparently there are many factors which influence the year a particular plant may bloom. Precipitation one to several years before blooming is probably of special importance. In the Peloncillo Mountains, about 2 to 5 percent of the agave population flowers each year (Peter Warren, Nature Conservancy, Tucson, pers. comm., 1997). Palmer's agave may occasionally produce off-sets (vegetative reproduction or cloning of "pups" produced from rhizomes) though this is less likely than for many other agave species (Hodgson, pers. comm., 1997). Parry's agave freely produces off-sets (Gentry 1982).

The importance of Parry's agave, as well as desert agave and amole, as a forage resource for *Leptonycteris* bats is unknown. As discussed, Parry's agave generally occurs at higher elevation than Palmer's agave, and occurs in forest openings. Benson and Darrow (1982) note that it

typically flowers in June and early July, which is before the lesser long-nosed bat arrives at roosts in southeastern Arizona. However, J. Rorabaugh (AESO, pers. comm., 1998) noted many Parry's agave in flower high in the Huachuca Mountains on the crest trail during late July in 1997. It may be that agaves at high elevation bloom later than at lower sites, and could potentially be blooming and be used as a forage resource when lesser long-nosed bats arrive in July or early August. In addition, Parry's agave may be very important as a forage plant for those bats which arrive in southeastern Arizona during late spring and early summer.

As indicated above, the lesser long-nosed bat consumes nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. These bats often forage in flocks. Nectar of these cacti and agaves is high energy food. Concentrations of some food resources appear to be patchily distributed on the landscape and the nectar of each plant species used is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available primarily from July through October. Columnar cacti occur in lower elevational areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desert scrub areas, semi-desert grasslands and shrublands, and into the oak woodland (Gentry 1982).

Lesser long-nosed bats appear to be opportunistic foragers and extremely efficient fliers. Seasonally available food resources may account for the seasonal movement patterns of the bat. The lesser long-nosed bat is known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 15 miles, and in Mexico at 25 miles and 38 miles (one way)(Dalton et al. 1994; V. Dalton, Tucson, pers. comm., 1997; Y. Petryszyn, University of Arizona, pers. comm., 1997). Steidl (pers. comm. 2001) found that typical one-way foraging distance for bats in southeastern Arizona is roughly 12.5 miles. A substantial portion of the lesser long-nosed bats at the Pinacate Cave in northwestern Sonora (a maternity colony) fly 25-31 miles each night to foraging areas in Organ Pipe Cactus National Monument (U.S. Fish and Wildlife Service 1995). Horner et al. (1990) found that lesser long-nosed bats commuted 30-36 miles round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 47 miles each night. Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest known potential roost site (Yar Petryszyn, pers. comm. 1997).

C. Status and Threats

Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species.

There are 16 known large roost sites in Arizona and Mexico (U. S. Fish and Wildlife Service 1995). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same surveys, the maternity roosts are occupied by over 150,000 lesser long-nosed bats and of these, just over 100,000 are found at just one natural cave

at Pinacate National Park, Sonora, Mexico (Cockrum and Petryszyn 1991). Several new large roost sites have been located in Arizona, bringing the total number of large roosts to 21 (Mike Coffeen, AESO, pers. com. 2001). The numbers above indicate that although a relatively large number of these bats are known to exist, the relative number of known large roosts is quite small. Disturbance of these roosts, or removal of the food plants associated with them could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

Suitable day roosts and concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (U.S. Fish and Wildlife Service 1995). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever determines roost suitability, the species seems sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days. However, this sensitivity suggests that the presence of alternate roost sites may be critical when disturbance occurs. Interspecific interactions with other bat species may also influence lesser long-nosed bat roost requirements.

Threats which may contribute to the decline of lesser long-nosed bat populations are excess harvesting of agaves in Mexico, the collection of cacti in the U.S., and the conversion of habitat for agricultural uses, livestock grazing and production of bufflegrass, wood-cutting, and other development.

The lesser long-nosed bat recovery plan (U.S. Fish and Wildlife Service 1995) identifies the need to protect foraging areas and food plants. Columnar cacti and agaves provide critical food resources for this bat. Populations of these plants need continued protection to sustain nectar-feeding bat populations. A critical need in this area is information about the size of the foraging areas around roosts so that adequate areas can be protected. This information will show the minimum area needed to support a roost of nectar- and fruit-eating bats, provided the roost locations are known. Additional life history information can be found in the recovery plan (U.S. Fish and Wildlife Service 1995) and other references cited therein.

We have produced numerous biological opinions on the lesser long-nosed bat since it was listed as endangered in 1988. Some of these opinions have included incidental take statements, although typically only for a small number of individuals. Survey data indicate that the number of bats estimated to occupy known sites is approximately 200,000.

ENVIRONMENTAL BASELINE

A. Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The FWS has

determined that the action area for the bat includes the areas directly impacted by the barrier installation (including the barrier and access roads) and an area around the project defined by a circle with a radius of 38 miles (the maximum documented one-way foraging distance of the bat). The action area is less than five percent of the range of the bat.

B. Terrain, Vegetation Communities, and Climate in the Action Area

A complete description of the region encompassing the action area has been previously provided (see “Environmental Baseline, part B. Terrain, Vegetation Communities, and Climate in the Action Area” for the Sonoran pronghorn).

C. Status of the Lesser Long-Nosed Bat in the Action Area

Lesser long-nosed bats are known to forage throughout much of the Organ Pipe Cactus NM where flowers and fruit of saguaro, organ pipe, barrel cactus, and agave are available. This species is routinely mist-netted at virtually all general bat monitoring sites (tinajas) in NPS (Organ Pipe Cactus NM unpubl. data).

Several large maternity roosts occur in the action area. Copper Mountain mine is located approximately 15 miles from the project area; the most recent estimate of roost size was approximately 25,000 bats at the peak of annual occupancy (Organ Pipe Cactus NM 2002). Bluebird Mine along the eastern border of Cabeza Prieta NWR is north of the project site (over 15 miles) and supports an estimated 3,000 bats (U.S. Fish and Wildlife Service 1995), although this mine was recently vandalized and is thought to support far fewer bats at the present time. The largest maternity roost in the project area is Pinacate Cave in northern Sonora, Mexico. Approximately 40 miles away from the project site, this roost is estimated to support 130,000 bats each year (U.S. Fish and Wildlife Service 1995). Slate Mountain, another large roost (8,000+), occurs nearby on Tohono O’odham lands.

Before they give birth, female bats probably occasionally move between the Bluebird and Copper Mountain roosts, and it has been recommended that these two roosts be censused simultaneously to avoid double-counting bats (U.S. Fish and Wildlife Service 1995). Observations at Copper Mountain and at Pinacate Cave indicate that they are occupied from mid-April to early-to-mid-September (U.S. Fish and Wildlife Service 1995), although these roosts reach their peak occupancy in mid-to-late June.

The Monument has not been well surveyed to determine the number of additional day and night roosts that might exist in natural caves and/or human-made tunnels. However, some additional roosts are known in and adjacent to NPS. Smaller day roosts are known in other mine tunnels, and are also suspected in other mines and natural rock crevices and caves. Short-term night roosts are known in natural caves, under the eaves of buildings, and inside several abandoned buildings associated with past ranching activities. One larger day roost is known in an abandoned mine adit just outside NPS, on Cabeza Prieta National Wildlife Refuge (Cockrum 1981, Cockrum and Petryszyn 1991). This colony is comprised of approximately 5,000 bats (C.

McCasland, Cabeza Prieta National Wildlife Refuge pers. comm., D. Dalton, unpubl. data). It is likely that there is within- and between-season interchange between these colonies, perhaps even within and between nights (U. S. Fish and Wildlife Service 1995).

The project is near the Puerto Blanco Mountains. These mountains are composed of highly eroded granite, volcanic tufts, rhyolite and basalt. Suitable day and night roosting habitat is present in natural caves and crevices, as well as several abandoned mines. These areas have not been surveyed for lesser long-nosed bat roosts.

A number of activities are taking place in the action area that could affect bats. In a September 30, 2002, biological opinion, we concurred with the Bureau of Land Management (BLM) that management of grazing leases on the Ajo allotments may affect, but is not likely to adversely affect the bat. Our 1997 biological opinion on the NPS Organ Pipe Cactus National Monument General Management Plan, found that the proposed action could result in take of bats from recreation; specifically from unauthorized human disturbance to the Copper Mountain maternity roost. The dramatic increases in undocumented immigrants and the associated damage resulting to the landscape from their activities, as well the activities of law enforcement in pursuit of undocumented immigrants, is becoming an increasing threat, not just to bats but to all wildlife of the region. The Bluebird Mine on Cabeza Prieta National Wildlife Refuge was vandalized in June 2002, probably by undocumented immigrants, and resulted in at least four dead bats. The population of the roost subsequently dropped from 3,000 to about 400 bats.

EFFECTS OF THE ACTION

No known or suspected roost sites will be directly impacted by the proposed action. At its closest point, the proposed action area is approximately 15 miles from the Copper Mountain maternity colony, and will have no direct or indirect effects on that colony site. The proposed action will not directly impact any potential roosting habitat on the Monument. As part of the conservation measures for the project, NPS will continue to monitor the Copper Mountain and other mines (such as the Victoria Mine complex roosts) to determine the presence and abundance of, and disturbance to, lesser long-nosed bats, including examining the roost year-round for evidence of human entry. If unauthorized entry into the Copper Mountain roost is discovered, NPS will take immediate action to prevent further disturbance to the roost, and will install additional exclusion devices as appropriate. NPS will, as funding permits, continue to investigate mines on Organ Pipe Cactus NM, identifying those that may provide roost sites, and enlarging openings in potential roost sites to facilitate entry of bats. The investigation will include those mines identified as bat roosts by the AGFD Natural Heritage Program. A report of this effort will be incorporated into Organ Pipe Cactus NM's annual summary of threatened and endangered species activities.

As discussed in the Effects of the Action for the pronghorn, the proposed action may redirect traffic to the west through Cabeza Prieta NWR and to the east through the Tohono O'odham Nation. We are not aware of bat roosts that would likely be affected on the Nation. However, redirected traffic to the west of the barrier may increase illegal activities at or near Bluebird

Mine, which occurs in the Growler Mountains on Cabeza Prieta NWR. As mentioned above, this roost was vandalized in June 2002, likely by undocumented migrants. A bat gate is being considered at this site, which would prevent further illegal entry into this roost.

The proposed project will result in destruction of lesser long-nosed bat food plants. Current estimates are that the proposed project would impact approximately 70 acres over and above the existing roadway area. Using the current estimate for the area impacted by the proposed project, NPS staff surveyed the area within 30 feet (9.15 m) of the current boundary fence for saguaro and organ pipe cactus, and also the wider staging and turn-around areas. For the 30-foot (9.15 m) primary project corridor, this survey was conducted as a one-time drive-through survey, traveling an average of approximately 5 mph (8 kph) along the existing fenceline/boundary road. Staging and turn-around areas were designed and located to avoid saguaro and organ pipe to the greatest extent possible, and were surveyed on foot to count those that could not be avoided. All saguaro and organ pipe cactus that could be seen were counted. The cacti counted were classified only as “small/salvageable” (< 3 feet for saguaros, < 3 feet and <4 stems for organ pipe) and “large” (everything larger). For the driving survey of the primary project corridor, several 300-foot (approx. 100-meter) stretches were also counted in walking surveys, to calibrate effectiveness of the driving survey. These “calibration” re-surveys indicated that cactus up to nearly 1.64 ft (0.5m) tall could be missed during the driving survey. Taking into consideration that potential under-count, and the probability that many if not most cactus smaller than about 8” (20 cm) tall were also missed, we estimate that up to approximately 750 to 1000 saguaro cactus, and 80 to 100 organ pipe will be destroyed. This estimate does not include the number of seedling (e.g. <2 in or <5 cm) saguaro and organ pipe cactus that would be destroyed, which could number thousands. Finally, some plants outside the 30-foot (9.15 m) survey strip may also be impacted, as roots and/or rooting areas damaged by the construction affect plant vigor and mortality. The visual drive-through survey counted 588 saguaros and 51 organ pipe cactus within the impact zone. Of these, 1 organ pipe and 13 saguaros were in the staging and turn-around areas. One section of approximately 0.5 mile (0.8 km) was not surveyed, due to suspicious persons hiding beneath a tree along the boundary fence.

Because the removal of the food plants described above may equate to reduction in food available to the lesser long-nosed bat, it must be considered an impact. The significance of this impact is difficult to evaluate when considered in the context of regional food supplies. Of the Monument’s approximately 330,000 acres, almost half (165,000 acres) may provide a relatively high density of foodplants for the lesser long-nosed bat. Loss of these 70 acres would constitute loss of very roughly 0.04% of the available foraging habitat on the Organ Pipe Cactus NM. It is unknown at this time how much additional loss of foraging habitat is taking place contemporaneously, due to extensive damage by smugglers and illegal immigrants, invasion by non-native plants, disease, or other factors.

The proposed project will result in up to approximately 70 acres of newly-disturbed ground, over and above the existing border maintenance road. This newly-disturbed ground will be susceptible to colonization by invasive exotic plants such as buffelgrass (*Pennisetum ciliare*), as described in the effects of the action for the Sonoran pronghorn. NPS will survey for and control

The proposed project is likely to facilitate the restoration and recovery of lesser long-nosed bat habitat that has been damaged by illegal off-road driving. Of the illegal roads illustrated in Figure 1, the eastern 2/3 are in desertscrub habitat with abundant forage plants (saguaro and organ pipe cactus). Illegal roads don't often cause immediate mortality of mature individuals of these large plants. However, the illegal roads may damage the shallow root systems of large individuals, causing loss of vigor or death later. Off-road driving routinely results in destruction of numerous small saguaro and organ pipe cactus (e.g. smaller than 2 ft/0.6m), and can be assumed to destroy large numbers of seedlings. The proposed vehicle barrier should eliminate or greatly reduce use of these roads, resulting in the eventual restoration of approximately 98 miles (158 km) of illegal roads in high-quality bat foraging habitat. Assuming an average width of approximately 8 feet, this equates to restoration of approximately 95 acres. In addition to this habitat restoration, the proposed project will prevent future habitat degradation of this type. NPS will also be rehabilitating most of areas that will be impacted by the proposed action and not needed for maintenance of the barrier. This will include soil rehabilitation and, seeding and transplanting of saguaro cactus, organ pipe cactus, and other plants.

CUMULATIVE EFFECTS

Cumulative effects are those adverse effects of future non-Federal (State, local government, and private) actions that are reasonably certain to occur in the project area. Future Federal actions would be subject to the consultation requirements established in section 7 of the ESA and, therefore, are not considered cumulative to the proposed project. Effects of past Federal and private actions are considered in the Environmental Baseline. Many of the activities expected to occur in the action area as defined would be on Federal land in the Monument, on Bureau of Land Management lands, and in Cabeza Prieta National Wildlife Refuge, and thus the effects of such activities are not considered cumulative. However, much of the action area also occurs on Tohono O'odham Nation lands, and a much smaller portion is on private lands in the U.S. and Mexico. Residential and commercial development, farming, livestock grazing, surface mining and other activities occur on these lands. These actions, the effects of which are considered cumulative, may result in small-scale loss or degradation of potential lesser long-nosed bat foraging habitat, and potential disturbance of roosts. In addition, and as described in the Cumulative Effects for the pronghorn, illegal smugglers and undocumented migrants commonly pass through the action area and have caused significant habitat disturbance. The maternity roost at Bluebird Mine was vandalized, probably by undocumented migrants in June 2002.

CONCLUSION

After reviewing the status of the lesser long-nosed bat, the environmental baseline for the project area, the effects of the proposed action, and cumulative effects, it is our biological opinion that the proposed project is not likely to jeopardize the continued existence of the lesser long-nosed

bat. No critical habitat has been designated for this species; therefore, none will be affected. Our conclusion that the proposed action is not likely to jeopardize the species is based on the following:

1. The project will not directly affect any known roosts. Planning is underway to address indirect effects to Bluebird Mine, including possibly constructing a bat gate that would prevent illegal entry.
2. The project will result in loss of lesser long-nosed bat foraging habitat, but the amount will be less than 1 percent of foraging habitat available to the bat within the Monument.
3. NPS will salvage some vegetation and collect seed, and rehabilitate most staging areas and access roads not being permanently maintained for barrier access (NPS 2003). NPS will salvage all saguaro, senita and organ pipe cactus up to 1 meter (about 3 feet) tall. NPS will attempt to salvage saguaros up to six feet tall. NPS estimates that 400-600 cacti will be salvaged.
4. NPS will continue to monitor the Copper Mountain roost to determine the presence and abundance of, and disturbance to, lesser long-nosed bats, including examining the roost year round for evidence of human entry.
5. If unauthorized entry into the Copper Mountain roost is discovered, NPS will take immediate action to prevent further disturbance to the roost, and will install additional exclusion devices as appropriate.
6. NPS will continue to monitor the Victoria Mine complex roost.
7. NPS will, as funding permits, continue to investigate mines on Organ Pipe Cactus NM, identifying those that may provide roost sites, and enlarging openings in potential roost sites to facilitate entry of bats. The investigation will include those mines identified as bat roosts by the AGFD Natural Heritage Program. A report of this effort will be incorporated into Organ Pipe Cactus NM's annual summary of threatened and endangered species activities.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.30). "Harass" is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental

to; and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to; and not intended as part of, the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount or Extent of Take Anticipated

We do not anticipate any incidental take of lesser long-nosed bats as a result of the proposed action.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the lesser long-nosed bat. In furtherance of the purposes of the ESA, we recommend implementing the following actions:

1. Monitor the effects of undocumented immigrants on lesser long-nosed bat roosts and foraging habitat; implement measures to protect roosts as necessary (Recovery Plan task 2 and 3).
2. Continue the control of non-native plants that may alter fire frequencies and intensities on the Monument and assist other agencies in developing methods for controlling these species (Recovery Plan task 2).
3. Implement the lesser long-nosed bat recovery plan, as appropriate.
4. Hire a full-time recovery projects coordinator for listed species at Organ Pipe Cactus NM. This coordinator could seek funding and facilitate implementation of proposed conservation measures for the lesser long-nosed bat, pygmy-owl, and other species; and serve as the Monument's contact for cooperative projects and coordination throughout the ranges of listed species occurring at the Monument.
5. In addition to rehabilitation of some of the areas disturbed by the action, rehabilitate areas that have been impacted by the illegal traffic (including using some of the transplanted cactus).

In order for the FWS to be kept informed of actions reducing or avoiding adverse effects or benefitting listed species or their habitat, we request notification of the implementation of any conservation recommendations.

CACTUS FERRUGINOUS PYGMY-OWL (*Glaucidium brasilianum cactorum*)**STATUS OF THE SPECIES**

A detailed description of the life history and ecology of the cactus ferruginous pygmy-owl (pygmy-owl) can be found in the Birds of North America (Proudfoot and Johnson 2000), Ecology and Conservation of the Cactus Ferruginous Pygmy-owl in Arizona (Cartron and Finch 2000), and in other information available from the Arizona Ecological Services Field Office (arizonaes.fws.gov). Information specific to the pygmy-owl in Arizona is preliminary. Research completed in Texas has provided useful insights into the ecology of this subspecies and, in some instances, represents the best available scientific information. However, habitat and environmental conditions are somewhat different than in Arizona and conclusions based on Texas information should be extrapolated to Arizona with caution.

A. Species Description, Listing, and Recovery Planning

The pygmy-owl is in the order Strigiformes and the family Strigidae. They are small birds of prey, averaging 6.75 inches in length. Males average 2.2 ounces with females slightly larger averaging 2.6 ounces. The pygmy-owl is reddish brown overall, with a cream-colored belly streaked with reddish brown. The crown is lightly streaked and a pair of dark brown/black spots outlined in white occur on the nape suggesting “eyes.” The species lacks ear tufts and the eyes are yellow. The tail is relatively long for an owl and is reddish brown in color with darker brown bars. Pygmy-owls have large feet and talons relative to their size.

The Arizona population of the pygmy-owl was listed as an endangered distinct population segment on March 10, 1997 (U.S. Fish and Wildlife Service 1997) without critical habitat. In response to a court order, approximately 731,712 acres of critical habitat were designated on July 12, 1999 (U.S. Fish and Wildlife Service 1999) in areas within Pima, Cochise, Pinal, and Maricopa counties in Arizona. However, on September 21, 2001, the U.S. District Court for the District of Arizona vacated this final rule designating critical habitat for the pygmy-owl, and remanded its designation back to us for further consideration. On November 27, 2002, we proposed 1,208,001 acres of critical habitat in Pima and Pinal counties in Arizona (U.S. Fish and Wildlife Service 2002).

In September 1998, we appointed the Cactus Ferruginous Pygmy-Owl Recovery Team. The Team is comprised of a Technical Group of biologists (pygmy-owl experts and raptor ecologists) and an Implementation Group which includes representatives from affected and interested parties (i.e., Federal and State agencies, local governments, the Tohono O’odham Nation, and private groups). A draft recovery plan was released in January 2003 (U.S. Fish and Wildlife Service 2003).

B. Distribution and Status

The cactus ferruginous pygmy-owl is one of four subspecies of ferruginous pygmy-owl. Cactus ferruginous pygmy-owls are known to occur from lowland central Arizona south through western Mexico to the States of Colima and Michoacan, and from southern Texas south through the Mexican States of Tamaulipas and Nuevo Leon. It is unclear at this time if the ranges of the eastern and western populations of the ferruginous pygmy-owl merge in southern Mexico. Recent genetic studies suggest that ferruginous pygmy-owl populations in southern Arizona and southern Texas are distinct subspecies, and that there is no genetic isolation between populations in the United States and those immediately south of the border in northwestern or northeastern Mexico (Proudfoot and Slack 2001). Results also indicate a comparatively low haplotypic diversity in the northwestern Tucson population, suggesting that it may be recently separated from those in the Altar Valley, Arizona, and in Sonora and Sinaloa, Mexico.

We are currently funding habitat studies and surveys in Sonora, Mexico to determine the distribution and relative abundance of the pygmy-owl there. The results of the first systematic surveys for pygmy-owls in Sonora, conducted in 2000, resulted in 279 confirmed detections and additional 22 possible detections (Flesch and Steidl 2000). Pygmy-owls were detected throughout the state of Sonora, from the international border south to Presa Alvaro Obregon, 19 miles from Ciudad Obregon. Twenty-six pygmy-owls were detected within six miles of the Arizona border (Flesch and Steidl 2000). Preliminary results for the 2001 surveys were similar. Further studies are needed to determine their distribution elsewhere in Mexico.

Given the new information about the status of the pygmy-owl in Mexico, there appears to be potential for movement of pygmy-owls across the international border, but the extent of this interaction remains unknown at this time. Information about the status of pygmy-owls on either side of the international border suggests that fewer pygmy-owls occur on the U.S. side of the border than one would expect. Clearly, maintaining connectivity between populations in the U.S. populations and Mexico will be critical in recovery of the pygmy-owl (U.S. Fish and Wildlife Service 2003).

The range of the Arizona DPS of the pygmy-owl extends from the International Border with Mexico north to central Arizona. The northernmost historical record for the pygmy-owl is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the pygmy-owl to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, prior to the mid-1900s, the pygmy-owl was "not uncommon," "of common occurrence," and a "fairly numerous" resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Additionally, pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (AGFD unpubl. data, Hunter 1988).

The majority of Arizona pygmy-owl detections in the last seven years have been from the northwestern Tucson area in Pima County. Pygmy-owls have also been detected in southern Pinal County, at the Monument, Cabeza Prieta NWR, Buenos Aires National Wildlife Refuge (BANWR), and on the Coronado National Forest. The results of surveys from 1997 to the present indicate both an increase in our knowledge of pygmy-owl distribution result from

increasing survey efforts over time, and recently what also appears to be a declining trend in numbers of pygmy-owls. In 1997, we knew of five pygmy-owls in the Tucson Basin and two adult males at Organ Pipe Cactus NM. In 1998, 35 pygmy-owls were confirmed. In 1999, a total of 41 adult pygmy-owls were found in Arizona at 28 sites. Surveys conducted in 2000 resulted in 34 adult pygmy-owls confirmed at 24 sites. Surveys conducted during the 2001 season resulted in a total of 47 adult pygmy-owls confirmed at 29 sites, including 17 nests, in Arizona. A 50 percent fledgling mortality occurred in 1999-2001, and no more than 12 owls were known to have successfully dispersed from natal areas in any one year. During 2002 surveys, only 18 adult pygmy-owls from 14 sites were confirmed. As with the pronghorn, the 2002 drought had severe impacts to pygmy-owl productivity. In comparison with 2001 when 17 nests were confirmed, only 3 nests were observed in 2002 (an 82 percent decline in nesting). From these 3 nests, 9 young were produced, all of which died.

C. Life History

Pygmy-owls are considered non-migratory throughout their range. There are winter (November through January) pygmy-owl location records from throughout its range in southern Arizona (R. Johnson unpubl. data 1976, 1980; University of Arizona 1995, Tibbitts, pers. comm. 1997, Abbate et al. 1999, 2000, U.S. Forest Service, unpubl. data). These winter records suggest that pygmy-owls do not migrate southward to warmer climates during the winter months.

The pygmy-owl is primarily diurnal (active during daylight) with crepuscular (active at dawn and dusk) tendencies. They can be heard making a long, monotonous series of short, repetitive notes, mostly during the courtship and nesting season which runs from February through July. Male pygmy-owls establish territories using territorial-advertisement calls to repel neighboring males and attract females. In Arizona, noticeable spontaneous calling begins in February, peaks from March-April, and tapers off by early June. Peak calling occurs from April-May in Texas, with incline and descent similar to Arizona birds. In Texas, spontaneous calling is infrequent from July through March; however, responses to broadcasted conspecific calls during this period were not reduced (Proudfoot and Beasom 1996). Pygmy-owls are most vocal and responsive during the courtship and nesting period (February through June above in this paragraph it says Feb-July). However, calling and defensive behavior is also manifest in nesting territories from fledging to dispersal (June through August).

Usually, pygmy-owls nest as yearlings (Abbate et al. 1999, Gryimek 1972), and both sexes breed annually thereafter. Territories normally contain several potential nest-roost cavities from which responding females select a nest. Hence, cavities/acre may be a fundamental criteria for habitat selection. Historically, pygmy-owls in Arizona used cavities in cottonwood, mesquite, and ash trees, and saguaro cacti for nest sites (Millsap and Johnson 1988). Most nests in recent years have been in saguaros.

Pygmy-owls exhibit a high degree of site fidelity once territories (the area defended) and home ranges (the area used throughout the year) have been established (AGFD unpubl. data). Because of strong site fidelity, pygmy-owls are more likely to be affected by projects within their home range. Behaviorally, the option to seek alternative areas outside of the home range appears

limited, particularly for males.

Data on the size of areas used by pygmy-owls on an annual basis in Arizona are limited. Until more complete information is available from Arizona, the home range size estimate we are using is based on telemetry work completed in Texas. In Texas, Proudfoot (1996) noted that, while pygmy-owls used between 3 and 57 acres during the incubation period, they defend up to 279 acres in the winter. Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 - 2,000 feet. Initial results from ongoing studies in Texas indicate that the home range of pygmy-owls may also expand substantially during dry years (G. Proudfoot unpubl. data). Therefore, a 280 acre home range is considered necessary for pygmy-owls to meet their life history requirements on an annual basis.

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. Documented and suspected pygmy-owl predators include great homed owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), screech-owls (*Otus kennicottii*), and domestic cats (*Felis catus*) (Abbate et al. 2000, AGFD unpubl. data). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate et al. 1999). Cover near nest sites may be important for young to fledge successfully (Wilcox et al. 1999, Wilcox et al. 2000).

Pygmy-owls typically hunt from perches in trees with dense foliage using a perch-and-wait strategy. Their diverse diet includes birds, lizards, insects, and small mammals (Bendire 1888, Sutton 1951, Sprunt 1955, Earhart and Johnson 1970, Oberholser 1974, Proudfoot 1996, Abbate et al. 1996,1999). Free-standing water does not appear to be necessary for the survival of pygmy-owls. It is likely that pygmy-owls meet much of their biological water requirements through the prey they consume. However, the presence of water may provide related benefits to pygmy-owls.

Additional life history information can be found on the Arizona Ecological Services website (arizonaes.fws.gov), in the draft recovery plan (U.S. Fish and Wildlife Service 2003), in published listing and critical habitat documents (U.S. Fish and Wildlife Service 1997, 1999, 2002), and in Abbate et al. (1999, 2000), Cartron and Finch (2000) and in Proudfoot and Johnson (2000).

D. Threats

The draft pygmy-owl recovery plan (U.S. Fish and Wildlife Service 2003) identified six reasons for decline of the pygmy-owl, that without management action, may negatively affect pygmy-owl recovery in Arizona and continue to contribute to their decline. These factors include: (1) habitat destruction and degradation; (2) human activity and mortality; (3) predation; (4) disease; (5) genetic stochasticity; and (6) fires.

Of the factors listed above, perhaps the most important in the decline of the pygmy-owl are loss and fragmentation of habitat (Oberholser 1974, Johnsgard 1988, Millsap and Johnson 1988, Wauer et al. 1993, Tewes 1995). Early (Bendire 1892, Fisher 1893, Gilman 1909, Swarth 1914, Griscom and Crosby 1926, Friedmann et al. 1950) and more recent (Falls 1973, Davis and

Russell 1979, 1984 and 1990) information suggest that indirect correlations exist between the decline in abundance of pygmy-owls and urban and agricultural expansion, such as that occurring in many portions of southern Arizona. Johnson et al. (1979) suggested that the destruction of riparian woodlands played a significant role in the decline of pygmy-owls in Arizona. It is estimated that between 85 and 90 percent of riparian woodlands in the southwestern U.S. have been lost or modified from a variety of land-use practices (e.g., Phillips et al. 1964, Carothers 1977, Kusler 1985, Jahrsdoerfer and Leslie 1988, U.S. Fish and Wildlife Service 1988, U.S. General Accounting Office 1988, Szaro 1989, Dahl 1990, State of Arizona 1990, Bahre 1991). Historically, and in recent decades, the loss of these habitats have impacted the pygmy-owl. Today, loss and fragmentation of upland and xeroriparian Sonoran Desert scrub and semidesert grassland vegetation from large scale residential and commercial developments continue to threaten the pygmy-owl.

Human-caused mortalities, both direct and indirect (e.g. collisions with cars, glass windows, fences, power lines, domestic cats, etc.) are beginning to be documented in Arizona (Abbate et al. 1999, AGFD unpubl. data) and may be underestimated. Human activities near nests at critical periods of the nesting cycle may cause pygmy-owls to abandon their nests sites, whereas activities during other periods could affect dispersal and foraging (U.S. Fish and Wildlife Service 2003).

Other potential threats include disease, genetic stochasticity, and fires (U.S. Fish and Wildlife Service 2003). Additional information on pygmy-owl distribution, status, and threats can be found on the Arizona Ecological Services website (arizonaes.fws.gov), in the draft recovery plan (U.S. Fish and Wildlife Service 2003), in published listing and critical habitat documents (U.S. Fish and Wildlife Service 1997, 1999, 2002), and in Abbate et al. (1999, 2000), Cartron and Finch (2000) and in Proudfoot and Johnson (2000).

Federal Projects Resulting in Incidental Take

To date, we have anticipated incidental take of pygmy-owls in only 5 instances: (1) Thornydale Road improvement project in Pima County, Arizona (consultation number 2-21-00-F-213, February 2002); (2) Dove Mountain Development in Marana, Arizona (consultation number 2-21-99-F-363, October 2000); (3) Issuance of an Endangered Species Act section 10(a)(1)(B) permit for the Lazy K Bar Ranch in association with a Habitat Conservation Plan (HCP) (consultation number 2-21-98-F-334, November 1998); (4) the Tucson Safford BLM Office Grazing Program in southern Arizona (consultation number 2-21-96-F-0160, September 1997); and (5) the Organ Pipe Cactus NM GMP (consultation number 2-21-89-F-078, June 26, 1997). In order to provide a complete account of the current status of the pygmy-owl in Arizona, we describe these actions in detail below.

Thornydale Road Improvement Project

The proposed action for the Thornydale Road improvement project involved the issuance of a National Pollutant Discharge Elimination System (NPDES) general permit under section 402 of

the Clean Water Act (CWA) from the EPA and a section 404 permit under the CWA from the Army Corps of Engineers (COE). The EPA was the lead Federal agency for this consultation. These permits allowed the widening and placement of flood control structures along Thornydale, Magee, and Cortaro Farms roads in Pima County, Arizona. Because of the inclusion of significant conservation measures, we did not anticipate the proposed action would incidentally cause any take in the form of harm, death, or injury of any pygmy-owl. The project site was, however, within a portion of a resident male pygmy-owl's home range. It was therefore believed possible that non-lethal incidental take (in the form of harassment only) of this pygmy-owl may occur as the result of ongoing construction activity.

The biological opinion presented four reasonable and prudent measures for reducing incidental take, which included: (1) minimize vegetation disturbance, loss of key habitat components, and other potential adverse effects to pygmy-owls within the estimated home range of the resident single or pygmy-owl pair; (2) minimize noise disturbance immediately adjacent to a pygmy-owl nest or activity center; (3) promote connectivity to allow for movement within pygmy-owl home ranges, between pygmy-owl sites and adjacent suitable habitat within the project site and Conservation Lands; and (4) monitor construction activities during and after completion of the project to ensure compliance with terms and conditions and to determine their effectiveness to accomplish their stated goals.

Dove Mountain Development

The proposed action for this consultation also involved the issuance of a NPDES general permit under section 402 of the CWA from the EPA and a section 404 permit under the CWA from the COE, with the EPA acting as the lead federal agency. These permits facilitated development within an approximately 5,924-acre residential and commercial development with parks and open space, located in Marana, Arizona.

We did not anticipate the proposed action would incidentally cause any take in the form of harm, death, or injury of a pygmy-owl. Further, there were no currently known nesting or resident pygmy-owl sites or portions of their home range within the project site. However, because nesting owls were nearby, we anticipated that, for a 20-30 year phased development project, it was reasonably certain that pygmy-owls would move onto or into the immediate vicinity of the project site and establish a nest or activity center. Therefore, it was anticipated that non-lethal incidental take (in the form of harassment only) of a pair or resident single pygmy-owl may occur if a pygmy-owl establishes a territory within 0.37 mile of ongoing development activity.

We provided the following reasonable and prudent measures in order to minimize take: (1) minimize vegetation disturbance, loss of key habitat components, and other potential adverse effects to pygmy-owls which are first detected prior to commencement of clearing vegetation for a construction phase within the estimated home range of a pair or resident single pygmy-owl; (2) minimize noise disturbance immediately adjacent to a pygmy-owl nest or activity center which is first detected prior to the commencement of clearing vegetation for a construction phase; (3) minimize vegetation disturbance, loss of key habitat components, and other potential adverse

effects to pygmy-owls which are first detected after commencement of clearing vegetation for a construction phase within the estimated home range of a pair or resident single pygmy-owl; (4) minimize noise disturbance immediately adjacent to a pygmy-owl nest or activity center which is first detected after commencement of vegetation clearing for a construction phase; (5) promote connectivity to allow for movement within pygmy-owl home ranges, between pygmy-owl sites and adjacent suitable habitat, in Conservation Lands, and Open Space areas; and (6) monitor development activities within the home range of a new pygmy-owl, and conservation measures, to ensure compliance with terms and conditions.

Lazy K Bar Ranch HCP

The proposed action was the issuance of an Endangered Species Act section 10(a)(1)(B) permit for the Lazy K Bar Ranch in association with a HCP. The project included the operation of a resort/guest ranch and ultimately its conversion into a low-density, residential area. The consultation covered both the transitional and residential phases of the project. We concluded that take, in the form of harassment due to habitat loss and noise disturbance, may result in up to two pygmy-owls and their young. We provided the following reasonable and prudent measures: (1) minimize the removal of suitable habitat areas associated with project development; (2) avoid disturbance of breeding pygmy-owls and loss of nest trees or saguaros while being used by pygmy-owls; (3) minimize habitat disturbance and loss of key habitat components during project development; and (4) monitor the effects of the proposed project on habitat quality over time, and ensure adherence to HCP criteria.

Safford and Tucson Livestock Grazing Program

The proposed action for this project was the issuance of permits to graze livestock on the Safford and Tucson districts of the BLM, the lead Federal agency for the consultation. This is a large programmatic consultation covering many allotments (over 250) that has been amended several times since the original opinion was issued in 1997. The most recent amendment to address the pygmy-owl was amendment four, which also addressed newly designated critical habitat. As mentioned above, pygmy-owl critical habitat has since been remanded to us by the district court and was proposed in November 2002 (U.S. Fish and Wildlife Service 2002).

We found, given the documentation of nesting pygmy-owls and good habitat on the Guild Wash and Owl Head allotments, and presence of a pygmy-owl nest within three miles of BLM lands on the Cross Triangle allotment, that take of pygmy-owls is reasonable likely to occur over the life of the proposed action (BLM grazing leases can be of any length of time, but cannot exceed ten years). We anticipated that up to one nesting pair of pygmy-owls and one unpaired pygmy-owl could be harmed due to: (1) construction of range improvement projects (corrals, fences, pipelines, tanks, etc.) or implementation of mechanical or chemical vegetation treatments, or prescribed fire that destroys nesting or foraging habitat, and (2) planting or seeding of non-native plants that may alter fire regimes and increase the chance that a wildfire would occur in occupied pygmy-owl habitat.

We provided the following reasonable and prudent measures in order to minimize take: (1) Actions shall be taken to minimize direct effects of cattle grazing on those habitats that, based on current knowledge, have the greatest potential to support pygmy-owls, (2) Activities that may result in a take of cactus ferruginous pygmy-owl or destruction of pygmy-owl habitat shall be evaluated, monitored, and modified as needed to reduce potential adverse effects to the pygmy-owl, (3) monitor incidental take resulting from the proposed action and report to the FWS the findings of that monitoring.

Organ Pipe Cactus NM GMP

We issued our biological opinion on the GMP on June 26, 1997. The opinion found that the effects of the action were not likely to jeopardize the continued existence of the Sonoran pronghorn, lesser long-nosed bat, or cactus ferruginous pygmy-owl. Additional information regarding the incidental take statement and other details for the pronghorn are found in the Environmental Baseline. In regard to the pygmy-owl, we anticipated take of 15 pygmy-owls in the form of harassment of individuals nesting or foraging in the area during the life of the project (15 years). The opinion contained four reasonable and prudent measures to minimize take of the pygmy-owl: (1) conduct a feasibility study to evaluate the effects of human presence on pygmy-owls in the Alamo Canyon campground; (2) establish closure areas on a case-by-case basis where pygmy-owls are detected along trails or other visited sites; (3) develop and implement interpretive media to elicit increased awareness of the vulnerability of pygmy-owls on the Monument in the event that pygmy-owl localities become common knowledge to the public and are being harassed; (4) monitor the effects of human visitation to Alamo Canyon Wash on pygmy-owls for the life of the project. A revised version of this opinion issued in April 7, 2003, anticipated no incidental take from the proposed action.

ENVIRONMENTAL BASELINE

A. Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). We have determined that the action area for the pygmy-owl is the project area and adjacent lands within 22 miles of the project area. We base this determination on the maximum dispersal distance of juvenile pygmy-owls from nests in Texas and Arizona (Proudfoot unpubl. data, AGFD unpubl. data). As delineated, the action area includes portions of the Cabeza Prieta NWR, BLM lands, and lands on the Tohono O'odham Nation and in Mexico.

B. Terrain, Vegetation Communities, and Climate in the Action Area

A complete description of Organ Pipe Cactus NM and surrounding areas has been previously provided (see "Environmental Baseline, part B. Terrain, Vegetation Communities, and Climate in the Action Area" for the Sonoran pronghorn).

C. Status of the Cactus Ferruginous Pygmy-Owl in the Action Area

Pygmy-owl presence at Organ Pipe Cactus NM has been surveyed since 1977, when two pairs were recorded. In 1982, one pair of pygmy-owls was found followed by two pairs in 1992. Through limited surveys, approximately 3 to 5 pygmy-owl territories have been located and monitored since 1995. Four pairs of pygmy-owls were located in 1999 and 4 pairs and 2 individuals were discovered in 2000. Surveys in 2001 detected 5 occupied territories, including 3 confirmed pairs with an additional pair strongly suspected. In contrast, during 2002, birds were detected at several locations early in the season, but as drought effects became more pronounced over the course of the year, owls became very difficult to detect. In 2002, owls were sporadically detected at 4 sites, only one pair was detected, and no nests were confirmed or suspected (Organ Pipe Cactus NM 2002). As of April 2003, pygmy-owls had been found at 3 sites, and were tentatively identified at a fourth site. No paired owls or nests had been found.

The status of the pygmy-owl at the Organ Pipe Cactus NM is unclear. Several territories in high-quality habitat are occupied almost every year (e.g. Kuakatch sites, Growler). Other sites of moderate quality are occupied more erratically (e.g. Armenta area). Several locations where pygmy-owls were routinely observed historically have not been re-occupied for a number of years (Residence/HQ area, Alamo), though a pygmy-owl was present at the Alamo site in 2003. In 2002, the continuing drought may have affected pygmy-owl nesting, as birds located in late winter were generally undetectable by mid-spring (Organ Pipe Cactus NM 2000, 2001, 2002). In recent years, two to three known pygmy-owl territories (“Boundary Bird,” “Armenta Southeast” and “Growler”) are known to have suffered habitat impacts and suspected to have suffered disturbance, due to illegal off-road driving by smugglers and illegal immigrants.

Construction and development projects in Organ Pipe Cactus NM have impacted the pygmy-owl and its habitat. Most of the construction and development is related to maintaining, improving, and/or expanding facilities used for management of and providing services to the visiting public. The majority of these actions center on the Twin Peaks area (Visitor Center, residence area, maintenance area, and campground) and have taken place in or adjacent to pygmy-owl habitat and territories. Furthermore, additional maintenance and upgrading projects are planned. Although a number of section 7 consultations regarding potential impacts to pygmy-owls have been conducted within the action area, only the original GMP opinion anticipated incidental take would result from these actions. The 1997 GMP biological opinion anticipated take of 15 owls in the form of harassment, as described above, but the revised biological opinion for the GMP (April 7, 2003) did not anticipate take from the proposed action.

On BLM lands, only the Cameron and Childs grazing allotments contain suitable pygmy-owl habitat. The Coyote Flat and Why allotments do not contain suitable or potential pygmy-owl habitat. According to the BLM, these allotments do not have the capability to produce potential or suitable habitat in the future because the washes are too small to support dense vegetation patches >3 acres in size. On the Cameron Allotment, a single pygmy-owl was detected at the Cuerda de Lena Wash in 1998. Surveys conducted by BLM contract during 2001 also detected a single pygmy-owl along Sikort Chuapo Wash on the Childs Allotment. The initial detection was

followed up by Tim Tibbitts (Organ Pipe Cactus NM), who stated that although the response call was somewhat atypical for a pygmy-owl, he was reasonably certain of his determination. For this reason, BLM states that this observation was only 70 percent confirmed. Due to the nature of the habitat, its proximity to other pygmy-owl locations, and the high degree of confidence in the determination, we treat this observation as a confirmed sighting. No pygmy-owls were documented on the five BLM allotments in the Ajo area during 2002 surveys. No survey data exist yet for 2003 for BLM lands. While there are no confirmed current records for pygmy-owl on BMGR, the Range overlaps the pygmy-owl's historical distribution and contains potentially suitable habitat (Dames and Moore 1995). In 2001, 2 new pygmy-owl sites were documented for Cabeza Prieta NWR, near Papago Well, which is within the action area. We have no information about pygmy-owl occurrence on the Tohono O'odham Nation or in Mexico within the action area.

Although owls have been detected on all federal lands contiguous to Organ Pipe Cactus NM, only Organ Pipe Cactus NM is known to have had nesting pygmy-owls consistently. Pygmy-owl locations in areas surrounding Organ Pipe Cactus NM may represent individuals dispersing into adjacent areas. Recent information has shown pygmy-owls to be more numerous adjacent to and near the Arizona border in Mexico (Flesch and Steidl 2000). There also exists considerable unsurveyed habitat on the Tohono O'odham Nation, and, although we have no means of quantifying this habitat, the distribution of recent sightings on non-Tribal areas east, west, and south of the U.S. portion of the Tohono O'odham Nation lead us to reasonably conclude that these Tribal lands may support meaningful numbers of pygmy-owls. Consequently, we believe that it is highly likely that the overall pygmy-owl population in Arizona is maintained by the movement and dispersal of owls among groups of pygmy-owls in southern Arizona and northern Mexico resulting from the connectivity of suitable habitat. Thus, Organ Pipe Cactus NM may represent an important source population for surrounding areas, as well as a dispersal corridor for pygmy-owls moving into the U.S. from Mexico.

The project area has not been surveyed for pygmy-owls, with two exceptions. An area of high habitat quality approximately two miles west of the Sonoyta Mountains and north of the South Puerto Blanco Drive was surveyed in 1998. No pygmy-owls were detected. Also, NPS files contain a single record of a pygmy-owl at Quitobaquito in 1964. Pygmy-owls have not been detected in recent years at Quitobaquito, in the course of surveys and general avian studies.

Habitat along the project area ranges from steep rocky slopes (unsuitable habitat), across upper, middle, and lower bajada settings (habitat of varying suitability), and traverses valley floor areas (generally unsuitable). The project also would pass through areas heavily impacted by past agriculture, current agriculture (in Mexico), urban development, and illegal cross-border traffic. These areas are largely unsuitable as pygmy-owl habitat.

NPS staff carried out an assessment of pygmy-owl habitat along the entire project length. The results of that assessment are presented in Table 5. This habitat assessment proceeds from east to west, from the western slope of the Sierra de Santa Rosa to the southwestern corner of the National Monument. The habitat assessment was based on the experiences of NPS staff with occupied and unoccupied habitat on the National Monument and other areas of southern Arizona,

and with the habitat descriptions provided in the critical habitat proposal (U. S. Fish and Wildlife Service 2002). Areas were considered to be of “High” quality if they had, within the disturbance corridor and in general surroundings, relatively high densities of Sonoran Desert scrub trees (e.g. mesquite, ironwood, palo verde, acacia), with many trees of fairly large stature, a fairly complex shrub layer, mixed cactus, and at least some saguaro cactus present. Areas were considered to be of “Moderate” quality if they supported typical middle bajada desert scrub of moderate density, with associations including trees (e.g. mesquite, ironwood, palo verde, acacia), shrubs (e.g. creosote bush, bursage, mixed cactus, ocotillo) with saguaro cactus present. Areas were considered to be of “Low” quality, and lacking the “primary constituent elements” of habitat (USFWS 2002), if they supported typical lower bajada desert scrub with an open character, low plant species diversity (e.g. creosote flats, saltbush flats), desert scrub trees present mainly in widely-separated washes, and saguaro cactus uncommon to rare. Areas were considered to be of “Poor” quality, and lacking the “primary constituent elements” of habitat, if they supported open or sparse vegetation as in “Low” quality, but of an even more monotypic, low-stature character, with few or no saguaro cactus or washes present, and/or on steep rocky slopes. Pygmy-owl habitat in Organ Pipe Cactus NM is of moderate to above-average quality. The area offers relatively dense and diverse upper bajada Sonoran Desert scrub, with a number of larger xeroriparian areas, and numerous smaller washes, including wash confluence areas. For purposes of this document, NPS considered ‘high’ and ‘moderate’ quality habitat to be ‘suitable habitat’ for the pygmy-owl.

D. Proposed Critical Habitat

The action area encompasses parts of pygmy-owl proposed critical habitat unit 5, and pygmy-owl recovery area 8 (U.S. Fish and Wildlife Service 2002, 2003). Critical habitat unit 5 runs from the Mexican border northward along the western edge of the Tohono O'odham Nation and is almost entirely under Federal ownership, including portions of Cabeza Prieta National Wildlife Refuge, Organ Pipe Cactus NM, and contiguous BLM land in the vicinity of the town of Ajo. This unit also contains a small amount of State Trust land. The area consists of Arizona upland Sonoran Desert scrub and lower Colorado River Sonoran Desert scrub. Recreation-related activities, undocumented alien traffic and management, and grazing on BLM lands are the primary management issues in this unit. Critical habitat unit 5 contains numerous pygmy-owl locations, including breeding sites. Since 1999, this critical habitat unit has accounted for approximately 21 percent of the known pygmy-owls in Arizona (Abbate et al. 1999, 2000; AGFD unpubl. data). We determined that this critical habitat unit is essential to pygmy-owl conservation, as it provides breeding habitat contiguous with pygmy-owls known to occur in Mexico and likely to occur on the Tohono O'odham Nation. The purpose of this critical habitat unit is to protect and maintain known breeding areas, provide connectivity to Mexico and the Tohono O'odham Nation, and allow for expansion of this subpopulation through dispersal. Recruitment and resulting expansion of the population in this area are necessary for the conservation of the species.

Critical habitat unit 5 contains all of the primary constituent elements. In the critical habitat proposal, we describe those physical and biological features that are essential to the conservation of the pygmy-owl. These are briefly summarized below in relation to critical habitat unit 5. See

the critical habitat rule for a more thorough discussion (U.S. Fish and Wildlife Service 2002).

The first primary constituent element provides the general biotic communities which are known to support pygmy-owl habitat in Arizona. We concluded that this element is essential to the conservation of the pygmy-owl because the species is not known to occur outside of these biotic communities. We included communities that pygmy-owls occurred in historically and currently. In critical habitat unit 5, and in the action area, this consists primarily of Sonoran Desert, particularly Sonoran Desert scrub, primarily below 4,000 feet elevation. The uplands of these areas are used by pygmy-owls, but the xeroriparian areas (desert washes) appear to be especially important. Sonoran Desert scrub communities are characterized by the presence of a variety of cacti, large trees, shrubs, and a diversity of plant species. This community includes, but is not limited to, palo verde, ironwood, mesquite, acacia, bursage, desert hackberry, gray thorn, and columnar cacti such as organ pipe (Gilman 1909, Bent 1938, van Rossem 1945, Phillips et al. 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnson-Duncan et al. 1988, Johnsgard 1988, Millsap and Johnson 1988). Xeroriparian drainages in Sonoran Desert scrub are used extensively by pygmy-owls for nesting and dispersal (Wilcox et al. 2000). Drainages concentrate available moisture influencing the diversity and structure of the vegetation, and, although they are characterized by the same species in the uplands, these species typically grow bigger and occur in higher densities within the drainages.

The second primary constituent element provides the components necessary for nesting, such as cavity availability and cover. Nesting cavities are located in trees, and within the action area/critical habitat unit 5, these are most likely to include mesquite, palo verde, ironwood and hackberry with a trunk diameter of 6 inches or greater measured 4.5 feet from the ground, or large columnar cacti such as saguaro or organ pipe larger than 8 feet in height. All but 2 nests found in recent years in Arizona were located in saguaro cacti (Abbate et al. 1996, 1999, 2000, AGFD unpubl. data).

The third primary constituent element consists of the structural makeup of habitat necessary to meet the biological needs of the pygmy-owl; such as breeding, nesting, roosting, perching, foraging, predator avoidance, and thermal cover, and also promotes prey diversity and availability. Multilayered vegetation (presence of canopy, midstory, and ground cover) provided by trees and cacti in association with shrubs and cacti such as acacia, prickly pear, desert hackberry, graythorn, etc., and ground cover such as triangle-leaf bursage, burroweed, grasses, or annual plants. Data gathered by AGFD indicates 35 and 48 percent ground cover at perch sites and nest sites, respectively; and 73 percent and 87 percent canopy cover at perch sites and nest sites, respectively, characterize vegetation communities used by pygmy-owl (Wilcox et al. 1999). These cover percentages are based on a small sample size, and were developed using methods to describe microhabitat characteristics, and so may have only limited applicability in project evaluation.

Pygmy-owls typically hunt from perches in trees with dense foliage using a perch-and-wait strategy; therefore, sufficient cover must be present within their home range for them to successfully hunt and survive. Pygmy-owls also hunt by inspecting tree and saguaro cavities for

other nesting birds, and possibly bats. Their diverse diet includes birds, lizards, insects, and small mammals (Bendire 1888; Sutton 1951; Sprunt 1955; Earhart and Johnson 1970; Oberholser 1974; Proudfoot 1996; Abbate et al. 1996, 1999). The density of annual plants and grasses, as well as shrubs, may be important to enhancing the pygmy-owl's prey base. Vegetation communities which provide a diversity of structural layers and plant species likely contribute to the availability of prey for pygmy-owls (Wilcox et al. 2000). Conservation of the pygmy-owl should include consideration of the habitat needs of prey species, including structural and species diversity and seasonal availability. Pygmy-owl habitat must provide sufficient prey base and cover from which to hunt in an appropriate configuration and proximity to nest and roost sites.

Primary constituent element 4 consists of vegetation providing mid-story and canopy level cover. This is provided primarily by trees greater than 6 feet in height in a configuration and density compatible with pygmy-owl flight and dispersal behaviors. Based on AGFD data, within 50-foot radius plots centered on nests and perch sites, the mean number of trees per plot in Sonoran Desert scrub plots was 12.5 with a mean height of 13 feet. These data are based on a small sample size and were developed using methods to describe microhabitat characteristics, therefore they may have only limited applicability in project evaluation. Cover and structural diversity of habitat are necessary for small scale movements associated with successful pygmy-owl breeding, foraging and nesting, as well as for longer movements associated with dispersal. Pygmy-owl dispersal patterns are just beginning to be documented. Dispersal of juvenile pygmy-owls from nests in Arizona have averaged 3.6 to 6.2 miles (Abbate et al. 1999, 2000). The maximum documented juvenile dispersal distance from nests is 34.8 km (21.8 mi) (AGFD unpubl. data). Juveniles typically disperse from natal areas in July and August and do not appear to defend a territory until September. They appear to fly from tree to tree instead of long flights and may move up to a mile or more in a night (Abbate et al. 1999). Trees of appropriate size and spacing appear to be necessary for successful dispersal, but specific data describing this pattern are currently unavailable. Pygmy-owls have rarely been observed using areas of high human activity, such as high-density (4-5 houses/ac) housing, for normal day-to-day activities within a home range, nor during dispersal (AGFD unpubl. data). Successful dispersal and gene flow is dependent on habitats in an appropriate configuration that are protected from disturbance.

Primary constituent element 5 consists of habitat elements configured, and human activity levels minimized so that unimpeded habitat use, based on pygmy-owl behavioral patterns (typical flight distances, activity level tolerance, etc.) can occur during dispersal and within home ranges (the total area used by an owl). Certain landscape level conditions may affect pygmy-owl behavioral patterns and relate to the need to protect habitats from various disturbances. Pygmy-owl behavior is not typically affected by low levels of human activity or activities which are predictable (Abbate et al. 1999, 2000; AGFD unpubl. data). Low-density (< 3 houses per acre) residential areas and roads with low traffic volumes are examples of this type of activity. However, high levels of human activities, high-intensity activities, or activities which cannot be predicted may affect the areas pygmy-owls will use for nesting, foraging, and dispersal (AGFD unpubl. data). High-density (3 houses per acre) residential, commercial areas with lights and constant high levels of activity or unpredictable activities of any level, ball fields, and roads with high traffic volumes are some examples of activity levels that could potentially affect pygmy-owl

behavior and habitat use. Habitat elements should be configured, and human activities should be minimized, so dispersal and other pygmy-owl activities within its home range are not impeded.

In the proposed critical habitat rule, we identify activities that may destroy or adversely modify critical habitat including those that alter the primary constituent elements to the extent that the value of critical habitat for the conservation of the species is appreciably diminished. Such activities may include, but are not limited to: (1) activities such as clearing of vegetation that appreciably reduce the value of the critical habitat for breeding; (2) activities such as clearing vegetation, road-building, or recreation that appreciably reduce the value of the critical habitat for connectivity; (3) activities such as clearing of vegetation, water diversion or impoundment, or high-impact recreation that appreciably reduce the value of the critical habitat for feeding by pygmy-owls; (4) activities that appreciably reduce the value of the critical habitat for other biological purposes (e.g., roosting, rearing, or other normal behavior patterns). The predominant federally funded programs and actions that may be affecting proposed critical habitat in the action area are: (1) funding or approval of road development, realignment, widening, or maintenance by the Federal Highway Administration resulting in the significant loss or degradation of the primary constituent elements; and (2) approval of actions related to grazing, mining, recreation, and land planning by the BLM and NPS that result in a significant loss or degradation of the primary constituent elements (U.S. Fish and Wildlife Service 2002).

Approximately the eastern 14 miles of the project are proposed as critical habitat for the pygmy-owl. Within that proposed critical habitat, and along the entire 30-mile length of the project, habitat for pygmy-owls varies from suitable to unsuitable. Expressed in terms of the definition of "critical habitat," within the proposed critical habitat, and along the entire 30-mile (48.4 km) length of the project, the "primary constituent elements" of pygmy-owl habitat alternate between present to absent.

EFFECTS OF THE ACTION

The proposed project will result in both adverse and beneficial effects on the cactus ferruginous pygmy-owl and proposed critical habitat. Negative effects include habitat disturbance, loss of saguaro and organ pipe cacti for nesting, visual and auditory disturbance from construction and maintenance of the barrier, and potentially redirecting vehicle use from Organ Pipe Cactus NM to other areas used by pygmy-owls. The proposed action will result in some habitat loss and modification including loss of less than 0.1 percent of proposed critical habitat in critical habitat unit 5, short-term noise disturbance and human activity associated with construction, and long-term noise disturbance and human activity from patrolling and maintenance of the barrier. Organ Pipe Cactus NM proposes a number of conservation measures that substantially reduce effects to the owl and its critical habitat. The decrease in impacts from illegal vehicle use off roads, and likely improvement of these areas both in habitat quality and decrease in human disturbance will likely benefit the pygmy-owl.

The proposed project will result in up to approximately 70 acres of newly-disturbed ground, over and above the existing border maintenance road. Of these 70 acres, 33 acres is suitable ("high"

and “moderate” quality) pygmy-owl habitat, and 37 acres is unsuitable habitat (“low” and “poor” quality) (Table 5). Some of these impacts would be a permanent conversion of suitable to unsuitable habitat, resulting in reduction of reproduction and foraging habitat in the immediate project area. This newly-disturbed ground will be susceptible to colonization by invasive exotic plants such as buffelgrass, as described in the effects of the action for the Sonoran pronghorn.

The project will impact over 1000 possible present and future nesting cacti, though some of these cacti likely will be salvaged and used in restoration of some areas. Since the general area contains numerous possible nesting cacti, it is unlikely that the removal of nesting substrates by this project would result in limiting present and future nesting opportunities.

Construction and maintenance of the barrier may result in disturbance to owls that may be in the general area (up to 1/4 mile (400 meters)). Very few surveys have been implemented in the project area. Considering that some of the areas along the barrier route are suitable habitat for nesting and foraging, it is not unlikely that these areas may be used by pygmy-owls in some years. Both construction actions and maintenance may disturb a pair of owls sufficiently to impact their reproductive success. NPS has proposed conservation measures for the barrier construction that will reduce or eliminate the likelihood of impacting reproduction, including limiting activities outside the breeding season, conducting surveys in and adjacent to suitable habitat before allowing activities to occur during the breeding season, and implementing seasonal restrictions during the breeding season if an owl is detected (within 1/4 mile (400 meters)). NPS has also proposed conservation measures for maintenance that will reduce or eliminate the likelihood of impacting reproduction, including conducting maintenance activities outside the breeding season in suitable habitat, or, if this is not possible because of law enforcement requirements, then conducting activities during the day when owls are least active. If any new owl territories are established during project implementation or the maintenance period, NPS will contact us to discuss how to minimize or eliminate adverse impacts while still conducting necessary maintenance.

The proposed project is likely to facilitate the restoration and recovery of pygmy-owl habitat on the Monument that has been damaged by illegal off-road driving. Of the illegal roads illustrated in Figure 1, the majority are in more open desertscrub habitat than is not typical for pygmy-owls (even though they are in proposed critical habitat). However, some of the illegal roads in Figure 1 pass through suitable pygmy-owl habitat, and even through pygmy-owl territories. Some of the roads pictured in Figure 1 are those in the northeastern corner of Monument. Although these roads originate locally from Highway 85, not the border, use of these roads should be eliminated or reduced by the vehicle barrier. These roads are typically established and used by people who have crossed the border illegally, then drive north on Highway 85, but then drive cross-country to circumvent the Border Patrol checkpoint just north of NPS. The proposed vehicle barrier should eliminate or greatly reduce use of these roads, resulting in the eventual restoration of approximately 47 miles of illegal roads in suitable habitat. Assuming an average width of approximately 8 feet, this equates to restoration of approximately 45.6 acres of suitable pygmy-owl habitat. In addition to this habitat restoration, the proposed project will prevent future habitat degradation of this type. Also, NPS will also be rehabilitating most of the areas that will

be impacted by the proposed action and not needed for maintenance of the barrier. This will include soil rehabilitation, seeding and transplanting of saguaro cactus, organ pipe cactus and other plants.

Up to 500 people per day and 700,000 pounds of drugs entered the United States illegally through NPS in FY2000. In 2001 and 2002, it was estimated that as many as 1000 people moved through NPS's backcountry illegally in some 24-hour periods during the peak months. The peak period for much of this travel is February-May, the pygmy-owl breeding season. While the vehicle barrier may not substantially reduce illegal foot traffic, it will reduce or eliminate illegal vehicular traffic at this sensitive time of year. Therefore the proposed project should significantly reduce disturbance of the cactus-ferruginous pygmy-owl on the Monument.

Several illegal roads traverse known pygmy-owl territories and are suspected to have caused disturbance and habitat degradation. As an example, the "Boundary Bird" territory, in high-quality habitat, was occupied by a pair in 2001. In late 2001 and 2002, smugglers established roads through the territory. The "Boundary Bird" territory was subsequently unoccupied in 2002.

Although illegal crossings and associated law enforcement are anticipated to decrease along the Monument's boundary, these same activities will likely increase at the eastern and western boundaries of the barrier. As smugglers and other illegals encounter the barrier, they will likely be diverted around the ends of the barrier into lands to the east and into the Cabeza Prieta NWR to the west. Redirected traffic to the west could increase levels of human disturbance near pygmy-owl sites near Papago Well and in proposed critical habitat on Cabeza Prieta NWR. We are currently in consultation with the Tucson Sector of the Border Patrol and will be working with them to reduce illegal activities and associated law enforcement in key areas for listed species, including this portion of Cabeza Prieta NWR. We are not aware of pygmy-owl locations on the Tohono O'odham Nation that may be affected by vehicles that will be potentially redirected to the east and through the Nation; however, redirected traffic in that area could increase levels of disturbance to any pygmy-owls occurring on the western end of the Nation.

The proposed project would directly impact approximately 36 acres of proposed critical habitat (Table 5, Part 1). Of those 36 acres, 12 acres were ranked as suitable ("high" or "moderate" quality), and 23 acres ranked as unsuitable ("low" or "poor" quality). Of the illegal roads illustrated in Figure 1, approximately 75% are within proposed critical habitat. Although not all this area is truly suitable pygmy-owl habitat, it should be noted that the proposed project would therefore allow restoration to begin on 111 miles of illegal roads. Assuming an average width of approximately 8 feet, this equates to restoration of approximately 108 acres of proposed pygmy-owl critical habitat. Overall, nesting and foraging habitat quality will decrease on the 12 acres of suitable habitat directly impacted by the proposed action, but will improve in the general area in the long-term because of direct and natural rehabilitation of some of the impacted areas and many of the illegal roads. There will be a possible disturbance to owls in the area in the short-

term from construction of the barrier, and to a much lesser degree from maintenance activities, but disturbance to owls from illegal activities will likely substantially decrease in the long-term after barrier installation.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Cumulative effects to pygmy-owls are similar to those described earlier for Sonoran pronghorn. Residential and commercial development, recreation, off-road vehicle use, grazing, and other activities on state and private lands in the action area continue to degrade or destroy pygmy-owl habitat and increase the likelihood of disturbance to pygmy-owls due to increased human presence. The ever increasing number of illegal border crossings by undocumented immigrants and smugglers, and associated illegal activities result in damage to habitat and potentially disturbance of pygmy-owls. Cutting of firewood can remove potential nest trees, and illegal campfires result in an increased risk of wildfire (NPS 2001).

CONCLUSION

After reviewing the current status of the pygmy-owl, the environmental baseline for the action area, the effects of the proposed and ongoing NPS action, and the cumulative effects, it is our biological opinion that the proposed action is neither likely to jeopardize the continued existence of the pygmy-owl nor result in destruction or adverse modification of proposed critical habitat. Our rationale for this finding is described below.

NPS has proposed conservation measures that significantly reduce the effects of the proposed action on the pygmy-owl:

1. NPS will salvage some vegetation and collect seed, and rehabilitate most staging areas and access roads not being permanently maintained for barrier access (NPS 2003). NPS will salvage all saguaro, senita and organ pipe cactus up to 1 meter (about 3 feet) tall. NPS will attempt to salvage saguaros up to six feet tall. NPS estimates that 400-600 cacti will be salvaged.
2. NPS will survey for and control invasive plants in the project area.
3. For construction Phase 1--Construction in areas of suitable pygmy-owl habitat (e.g. between Lukeville and Monument Hill) will take place outside the breeding season (breeding season is February 1 to July 31).
4. If activities may occur in high and moderate quality habitat during the breeding season (February 1 to July 31) during Phase 2 or Phase 3, NPS will conduct surveys in, and within

400 meters of, high and moderate quality habitat in the project area of those Phases.

- a. Phase 2: NPS will complete 'one-year' pygmy-owl surveys during the survey season of 2004 (January 1 to June 30). NPS will conduct a total of six visits, with four of these visits conducted between February 15 to ~~April~~ ~~May~~ 15. The visits will be spaced at least 15 days apart.
 - b. Phase 3: NPS will complete the two-year survey protocol for project clearance as presented in 'Cactus Ferruginous Pygmy-owl Survey Protocol', January 2000.
5. If owls are detected either through surveys or incidentally in or near the project area, activities will not occur within 400 meters of the nesting area (if it can be determined) or detection site during the breeding season.
 6. NPS and we will coordinate in determining if some areas of suitable habitat may be impacted during the breeding season without surveys depending on the existing level of disturbance that may already be occurring in specific areas.
 7. NPS will conduct maintenance activities outside the breeding season (February 1 to July 31) in suitable habitat. If this is not possible because of law enforcement requirements, then maintenance activities during the breeding season in suitable habitat will be conducted from three hours after sunrise to two hours before sunset to avoid the most active times for pygmy-owls. If any new owl territories are established during project implementation or the maintenance period, NPS will contact us to discuss how to minimize or eliminate adverse impacts while still conducting necessary maintenance.
 8. NPS will use its authorities to implement, as funding permits, a new program specifically to develop inventory and monitoring information on Organ Pipe Cactus NM about the pygmy-owl.
 9. NPS will mutually develop with U.S. Border Patrol (Border Patrol) a comprehensive plan to manage human activity in backcountry areas associated with illegal traffic and associated law enforcement activities. The plan will include management actions specific to all listed species that occur on Organ Pipe Cactus NM, and will contain measures that specifically address minimization of noise and human activities near pygmy-owl nest sites and known areas of pygmy-owl occurrence such as the Armenta Southeast, Boundary Site, Kuakatch, Growler, and Arch survey areas. The plan will be developed as soon as feasible, provided cooperation from Border Patrol on the plan can be obtained. Once completed, NPS will provide us a copy of the plan, and will continue ongoing dialogs with the Border Patrol on both resource management and law enforcement issues and sharing of information. NPS will continue to provide Border Patrol agents with training on resource management policies and protection, including those relevant to threatened and endangered species. NPS will continue to monitor, document, and mitigate the impacts of undocumented aliens and smugglers on the natural resources of the Monument.
 10. NPS will use its authorities to acquire and add to the Monument the section of state lands containing Growler Canyon (R7W, T14S, Section 36, Bates Well Quad).

In summary, our conclusion that the proposed action is not likely to jeopardize the continued existence of the pygmy-owl is based on our analysis of the status of the pygmy-owl rangewide, the environmental baseline, the effects of the proposed action, and the cumulative effects. The status of the pygmy-owl has declined dramatically from historical levels and continues to be in decline. The 2002 drought resulted in an observed 82 percent reduction in nesting. Fragmentation of populations, loss of historical habitats, and human-caused loss and modification of remaining habitats and disturbance of pygmy-owls are the most important causes of poor status. Cumulative effects, particularly illegal crossings of the border and travel through pygmy-owl habitat by smugglers and undocumented immigrants and associated response by law enforcement, add additional significant stressors to pygmy-owl populations in the action area.

At the current time the environmental baseline with respect to the pygmy-owl is declining. However, preliminary results of surveys in Sonora, Mexico, indicate significant populations (which are not listed, but may contribute individuals to the listed population through immigration) of the pygmy-owl may remain in Mexico. NPS can mitigate its contribution to future declines of the pygmy-owl through prompt and full implementation of their conservation measures. NPS can do nothing to mitigate for the decline of the pygmy-owl caused by drought and development outside of its borders. When added to the environmental baseline, the status of the species, and cumulative effects, the effects of NPS's proposed action, which includes significant new conservation measures, do not reduce appreciably the likelihood of survival and recovery of the distinct population segment in the wild. Therefore, the NPS action, with modifications and conservation measures, will not jeopardize the continued existence of the pygmy-owl. As proposed, NPS actions do not significantly adversely affect important pygmy-owl nesting areas or result in the destruction or adverse modification of critical habitat. Concerns about habitat deterioration and human caused disturbance are minimized by NPS's conservation measures. In determining that the proposed action is not likely to jeopardize the continued existence of the pygmy-owl, we assume that the conservation measures will be implemented fully and promptly and we will be successful in working with the Border Patrol on any potential redirecting of illegal traffic to Cabeza Prieta NWR.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (50 CFR 17.3). "Harm" is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part

of the agency action is not considered to be prohibited taking under the provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount or Extent of Take Anticipated

We do not anticipate the proposed action will incidentally take any pygmy-owl based on the current project description and prompt implementation of the proposed conservation measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend implementing the following actions:

1. In addition to rehabilitation of some of the areas disturbed by the action, rehabilitate areas that have been impacted by the illegal traffic (including using some of the transplanted cactus).
2. Assist in the implementation of recovery tasks identified in the pygmy-owl recovery plan when approved (see U.S. Fish and Wildlife Service 2003).
3. Leave saguaros and organ pipe cacti in construction areas in place if possible. If they must be removed, they should be transplanted to disturbed areas of Organ Pipe Cactus NM. Transplanting protocols and care of transplanted cacti should meet horticultural standards necessary to ensure high survivorship of transplants.
4. Hire a full-time recovery projects coordinator for listed species at Organ Pipe Cactus NM. This coordinator could seek funding and facilitate implementation of proposed conservation measures for the pygmy-owl, lesser long-nosed bat, and other species; and serve as the Monument's contact for cooperative projects and coordination throughout the ranges of listed species occurring at the Monument.

DISPOSITION OF DEAD OR INJURED LISTED ANIMALS

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: (480) 967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve

biological material in the best possible condition. If feasible, the remains of intact specimens of listed animal species shall be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution prior to implementation of the action. Injured animals should be transported to a qualified veterinarian by a qualified biologist. Should any treated listed animal survive, the Service should be contacted regarding the final disposition of the animal.

REINITIATION NOTICE

This concludes formal consultation on the vehicle barrier at Organ Pipe Cactus NM. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation and assistance throughout this consultation process. Any questions or comments should be directed to Mark Crites (520/620-7513) or Jim Rorabaugh (x238).

/s/ Steven L. Spangle

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LITERATURE CITED

- Abbate, D., A. Ditty, S. Richardson, and R. Olding. 1996. Cactus ferruginous pygmy-owl survey and nest monitoring in the Tucson Basin area, Arizona: 1996. Final Rep. Internal Enhance. #U95503, Arizona Game and Fish Dept., Phoenix.
- Abbate, D., S. Richardson, R. Wilcox, M. Terrio, and S. Belhumeur. 1999. Cactus ferruginous pygmy-owl investigations in Pima and Pinal and Fish Department Region 5 Wildlife Program. Phoenix. 83 pp.
- Abbate, D.J., W.S. Richardson, R.L. Wilcox, and S. Lantz. 2000. Cactus ferruginous pygmy-owl investigations in Pima and Pinal Counties, Arizona: 1999. Reg. V Wldlf. Prog. Arizona Game and Fish Dept. Tucson.
- Arizona Game and Fish Department. 1981. The Sonoran pronghorn. Special Report No. 10. Arizona Game and Fish Department, Phoenix, AZ.

- . 1985. Interim report on the Sonoran pronghorn (*Antilocapra americana sonoriensis*). Oct. 1983 - March 1985. Arizona Game and Fish Department, Phoenix, AZ.
- . 1986. Final Report on Sonoran Pronghorn Status in Arizona, Arizona Game and Fish Department, Phoenix, AZ. 132 pp.
- Bahre, C.J. 1991. A legacy of change: historic human impact on vegetation in the Arizona borderlands. Univ. Arizona Press, Tucson.
- Bendire, C.E. 1888. Notes on the habits, nests, and eggs of the genus *Glaucidium* Boie. *Auk* 5:366-372.
- Benson, L. 1982. The cacti of the United States and Canada. Stanford Univ. Press, Stanford, California.
- Benson, L., and R.A. Darrow. 1982. Trees and shrubs of the Southwest deserts. University of Arizona Press, Tucson.
- Bent, A.C. 1938. Life histories of North American birds of prey, part 2. U.S. National Museum Bulletin 170. 482 pp.
- Breninger, G.F. 1898. The ferruginous pygmy-owl. *Osprey* 2(10):128 (In Bent 1938).
- Bright, J.L., J.J. Hervert, L.A. Piest, R.S. Henry, and M. T. Brown. 1999. Sonoran pronghorn 1998 aerial survey summary. Nongame and Endangered Wildlife Program Technical Report No. 152. Arizona Game and Fish Department, Phoenix, AZ.
- Bright, J.L., J.J. Hervert, and M.T. Brown. 2001. Sonoran pronghorn 2000 aerial survey summary. Technical Report No. 180. Arizona Game and Fish Department, Phoenix, AZ.
- Brown, D.E. 1994. (ed) Biotic communities: Southern United States and Northwestern Mexico. Univ. of Utah Press, Salt Lake City.
- Byers, J.A. 1997. American Pronghorn, Social Adaptations and the Ghosts of Predators Past. University of Chicago Press, Chicago, IL.
- Carothers, S.W. 1977. Importance, preservation, and management of riparian habitats: an overview. Pp. 2-4 in Importance, preservation, and management of riparian habitats: a symposium (R.R. Johnson and D.A. Jones, tech. coords.). GTR-RM-43; USDA For. Serv., Rocky Mountain Forest and Range Exper. Stat., Fort Collins, CO.
- Carr, J.N. 1970. Endangered species investigation. Sonoran pronghorn. Arizona Game and Fish Department, Phoenix, AZ.
- Carr, J.N. 1971. Progress report-Endangered species investigation. Sonoran pronghorn.

- Arizona Game and Fish Department, Phoenix, AZ.
- Carr, J.N. 1972. Progress report-Endangered species investigation. Sonoran pronghorn. Arizona Game and Fish Department, Phoenix, AZ.
- Carr, J.N. 1974. Complete report-Endangered species investigation. Sonoran pronghorn. Arizona Game and Fish Department, Phoenix, AZ.
- Catron, J.E., and D.M. Finch (eds.). 2000. Ecology and conservation of the cactus ferruginous pygmy-owl. USDA, Forest Service, General Technical Report RMRS-GTR-43.
- Cherkovich, G.M., and S.K. Tatoyan. 1973. Heart rate (radiotelemetric registration) in macaques and baboons according to dominant-submissive rank in a group. *Folia Primatol* 20:265-273.
- Cockrum, E.L. 1981. Bat populations and habitats at the Organ Pipe Cactus National Monument. Technical report No. 7. Cooperative National Park Resources Studies Unit, University of Arizona, Tucson. 31 pp.
- Cockrum, E.L., and Y. Petryszyn. 1991. The lesser long-nosed bat. *Leptonycteris*: An endangered species in the Southwest? Texas Tech Univ., Occas. Pap. Mus., Number 142.
- Dahl, T.E. 1990. Wetland losses in the United States, 1780s to 1980s. USDI Fish and Wildl. Serv., Washington, D.C. 13 pp.
- Dalton, V.M., D.C. Dalton, and S.L. Schmidt. 1994. Roosting and foraging use of a proposed military training site by the long-nosed bat, *Leptonycteris curasoae*. Report to the Luke Air Force Natural Resources Program, Contract Nos. DACA65-94-M-0831 and DACA65-94-M-0753. 34pp.
- Dames and Moore. 1995. Biological assessment for the Marine Corps Use of the Barry M. Goldwater Range, Arizona. Report to Marine Corps Air Station, Yuma, AZ.
- Davis, W.A. and S.M. Russell. 1979. Birds in southeastern Arizona. Tucson Audubon Soc., Tucson, AZ.
- Davis, W.A. and S.M. Russell. 1984. Birds in southeastern Arizona. Tucson Audubon Society, Tucson, AZ. 169 pp.
- Davis, W.A. and S.M. Russell. 1990. Birds in southeastern Arizona. 3rd ed. Tucson Audubon Soc., Tucson, AZ.
- Defenders of Wildlife. 1998. Population viability analysis workshop for the endangered Sonoran pronghorn (*Antilocapra americana sonoriensis*) in the United States. Defenders of Wildlife unpublished manuscript, Washington, D.C.

- deVos, J.C. 1990. Selected aspects of Sonoran pronghorn research in Arizona and Mexico. In P.R. Krausman and N.S. Smith, eds., *Proceedings of the Symposium: Managing Wildlife in the Southwest*. Tucson, AZ.
- deVos, J.C. 1998. Habitat selection patterns by Sonoran pronghorn in southwest Arizona. In T.J. Tibbetts and G.J. Maender, eds., *First Conference on Research and Research Management in Southern Arizona: Extended abstracts*. Organ Pipe Cactus National Monument and Cooperative Park Studies Unit, University of Arizona, Tucson, AZ.
- Earhart, C.M., and N.K. Johnson. 1970. Size dimorphism and food habits of North American owls. *Condor* 72(3):251-264.
- Ehrlich, P.R., and J. Roughgarden. 1987. *The Science of Ecology*. MacMillan Publishing Co., New York, N.Y.
- Engelman, George 1875. Notes on agave. *Trans. Acad. St. Louis, Missouri*. 3: 201-322.
- Falls, B.A. 1973. Noteworthy bird records from south Texas (Kennedy County). *Southwest. Nat.* 18:244-247.
- Felger, R.S. 1980. Vegetation and flora of the Gran Desierto. *Desert Plants* 2(2):87-114.
- Felger, R.S. 2000. *Flora of the Gran Desierto and Rio Colorado of Northwestern Mexico*. University of Arizona Press, Tucson, AZ.
- Fisher, A.K. 1893. *The hawks and owls of the United States in their relation to agriculture*. U.S. Gov. Print. Off., Washington DC.
- Flesch, A.D. and R.J. Steidl. 2000. Distribution, habitat and relative abundance of cactus ferruginous pygmy-owls in Sonora, Mexico: 2000 annual report. School of Renewable Natural Resources, University of Arizona, Tucson, Arizona.
- Fox, L.M., P.R. Krausman, M.L. Morrison, and R.M. Kattnig. 1997. Nutritional content of forage in Sonoran pronghorn habitat, Arizona. Masters Thesis, University of Arizona, Tucson, AZ.
- Fox, L.M., P.R. Krausman, M.L. Morrison, and R.M. Kattnig. 2000. Water and nutrient content of forage in Sonoran pronghorn habitat, Arizona. *California Fish and Game* 86(4): 216-232.
- Friedmann H., L. Griscom, and R.T. Moore. 1950. *Birds of Mexico. Part I. Pac. Coast Avifauna* 29.

- Geist, V. 1971. A behavioral approach to the management of wild ungulates. In E. Duffy and A.S. Watts, eds., *The Scientific Management of Animal and Plant Communities for Conservation*. Symposium of the British Ecological Society No. 11. Blackwell Science Publications, Oxford, U.K.
- Gentry, H.S. 1982. Agaves of continental North America. Pages 443-447 and 538-545, University of Arizona Press, Tucson, Arizona.
- Gilman, M.F. 1909. Some owls along the Gila River in Arizona. *Condor* 11:145-150.
- Gilpin, M.E. and M.E. Soulé. 1986. Minimum viable populations: processes of extinction. In M.E. Soulé, ed., *Conservation Biology: The science of scarcity and diversity*. Sinauer Associates, Sunderland, MA.
- Goldman, E.A. 1945. A new pronghorn from Sonora. *Proceedings of the Biological Society, Washington* 58:3-4.
- Griscom, L. and M.S. Crosby. 1926. Birds of the Brownsville region, southern Texas. *Auk* 43:18-36.
- Gryimek, H.C.B. (ed.). 1972. *Gryimek's animal life encyclopedia*. Van Nostrand Reinhold Co., New York.
- Hall, E.R. 1981. *The mammals of North America*. John Wiley and Sons, New York, NY.
- Halloran, A.F. 1957. A note on Sonoran pronghorn. *J. Mammal.* 38(3):423.
- Harlow, H.J., E.T. Thorn, E.S. Hilliams, E. L. Belden, and W.A. Gern. 1987. Cardiac frequency: a potential predictor of blood cortisol levels during acute and chronic stress exposure in Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). *Canadian Journal of Zoology* 65:2028-2034.
- Hecht, A. and P.R. Nickerson. 1999. The need for predator management in conservation of some vulnerable species. *Endangered Species Update* 16:114-118.
- Hervert, J.J., L.A. Piest, R.S. Henry, and M.T. Brown. 1997a. Sonoran pronghorn 1996 aerial survey summary. Nongame and Endangered Wildlife Program Technical Report No. 124. Arizona Game and Fish Department, Phoenix, AZ.
- Hervert, J.J., L.A. Piest, W. Ballard, R.S. Henry, M.T. Brown, and S. Boe. 1997b. Sonoran pronghorn population monitoring: progress report. Nongame and Endangered Wildlife Program Technical Report 126. Arizona Game and Fish Department, Phoenix, AZ.

- Hervert, J.J., J.L. Bright, M.T. Brown, L.A. Piest, and R.S. Henry. 2000. Sonoran pronghorn population monitoring: 1994-1998. Nongame and Endangered Wildlife Program Technical Report No. 162. Arizona Game and Fish Department, Phoenix, AZ.
- Hoffmeister, D.F. 1986. Mammals of Arizona. University of Arizona Press, Tucson.
- Horner, M.A., T.H. Fleming, and M.D. Tuttle. 1990. Foraging and movement patterns of a nectar feeding bat: *Leptonycteris curasoae*. *Bat Research News* 31:81.
- Hosack, D.A., P.S. Miller, J.J. Hervert, and R.C. Lacy. A population viability analysis for the endangered Sonoran pronghorn, *Antilocapra americana sonoriensis*. *Mammalia* 66(2):207-229.
- Hughes, K.S., and N.S. Smith. 1990. Sonoran pronghorn use of habitat in Southwest Arizona. Report to Cabeza Prieta National Wildlife Refuge, Ajo, AZ.
- Humphrey, R.R. 1987. 90 Years and 535 Miles, Vegetation Changes Along the Mexican Border. University of New Mexico Press, Albuquerque, NM.
- Hunter, W.C. 1988. Status of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) in the United States and Northern Mexico. U.S. Fish and Wildlife Service, Phoenix, Arizona. 13 pp.
- Jahrsdoerfer, S.E. and D.M. Leslie, Jr. 1988. Tamaulipan brushland of the Lower Rio Grande Valley of South Texas: description, human impacts, and management options. *USDI Fish and Wildl. Serv. Biol. Rep.* 88(36).
- Johnsgard, P.A. 1988. North American owls. Smithsonian Institution Press, Washington, D.C. 295 pp.
- Johnson, B.K., F.G. Lindzey, and R.J. Guenzel. 1991. Use of aerial line transect surveys to estimate pronghorn populations in Wyoming. *Wildlife Society Bulletin* 19:315-321.
- Johnson, R.R., and L.T. Haight. 1985. Status of the ferruginous pygmy-owl in the southwestern United States. Abstracts, 103rd Stated Meeting of the American Ornithologists' Union, Arizona State University, Tempe.
- Johnson, R.R., L.T. Haight, and J.M. Simpson. 1979. Owl populations and species status in the southwestern United States. Pp. 40-59 in P. Schaffer and S.M. Ehler (eds.), *Owls of the west: their ecology and conservation*. *Proc. Natl. Audubon Soc.*, George Whittel Education Center, Tiburon, CA.
- Johnson-Duncan, E.E., D.K. Duncan, and R.R. Johnson. 1988. Small nesting raptors as indicators of change in the southwest desert. Pp. 232-236 in R.L. Glinski et al. (eds.),

- Proceedings of the Southwest Raptor Management Symposium and Workshop. Nat. Wildl. Fed., Washington, D.C. 395 pp.
- Kindschy, R.R., C. Sundstrom, and J.D. Yoakum. 1982. Wildlife habitats in managed rangelands - the Great Basin of southeastern Oregon: pronghorn. General Technical Report PNW-145. U.S. Department of Agriculture, Northwest Forest and Range Experimental Station, Portland, OR.
- Klein, K. 2000. Mass smugglings of immigrants on the increase. March 13, Desert Sun, Palm Springs, www.thedesertsun.online.com.
- Krausman, P.R., L.K. Harris, and J. Francine. 2001. Long-term study of the noise effects of military overflights on the Sonoran pronghorn, Barry M. Goldwater Range, Luke Air Force Base, Arizona. U.S. Air Force Contract F41624-98-C-8020-P00003.
- Kusler, J.A. 1985. A call for action: protection of riparian habitat in the arid and semi-arid West. Pp. 6-8 in Riparian ecosystems and their management: reconciling conflicting uses, first North American Riparian Conference (R.R. Johnson et al., tech. coords.). GTR-RM-120; USDA For. Serv., Rocky Mountain Forest and Range Exper. Stat., Fort Collins, CO.
- Leftwich, T.J., and C.D. Simpson. 1978. The impact of domestic livestock and farming on Texas pronghorn. Pronghorn Antelope Workshop Proceedings 8:307-320.
- Marine Corps Air Station (MCAS)-Yuma. 2001. Yuma Training Range Complex draft supplemental environmental impact statement. U.S. Department of Defense, Marine Corps Air Station, Yuma, AZ.
- Mearns, E.A. 1907. Mammals of the Mexican boundary of the United States, Part 1. Bulletin of the U.S. National Museum 56:XVT530.
- Millsap, B.A. and R.R. Johnson. 1988. Ferruginous pygmy-owl. Pages 137-139 in R.L. Glinski et al., eds. Proceedings of the Southwest Raptor Management Symposium and Workshop. Nat'l. Wildl. Fed., Washington.
- Millstead, B, and B. Barns. 2002. Life on the border: monitoring the effects of border-crossing and law enforcement on natural resources. Page 32 in Abstracts of the Fourth Conference on Research and Resource Management in the Southwestern Deserts: Meeting Resource Management Information Needs. May 15-17, 2002, Tucson, Arizona.
- Moen, A.N., M.A. DellaFera, A.L. Hiller, and B.A. Buxton. 1978. Heart rates of white-tailed deer fawns in response to recorded wolf howls. Canadian Journal of Zoology 56:1207-1210.
- Monson, G. 1968. The desert pronghorn. In Desert Bighorn Council Transactions. Las Vegas, NV.

- Monson, G. and A.R. Phillips. 1981. Annotated checklist of the birds of Arizona. The Univ. of Arizona Press, Tucson. 240 pp.
- National Park Service. 2001. Final supplemental environmental impact statement, re-analysis of cumulative impacts on the Sonoran pronghorn. Organ Pipe Cactus National Monument, Ajo, AZ.
- National Park Service. 2003. Restoration plan for the proposed vehicle barrier along the International Boundary, Organ Pipe Cactus National Monument. Organ Pipe National Monument, Ajo, AZ.
- Nelson, F.W. 1925. Status of the pronghorn antelope, 1922-1924. U.S. Department of Agriculture Bulletin No. 1346.
- Nicol, A.A. 1941. Game reconnaissance of southwestern Arizona, South of the Gila River. Unpublished. Arizona Game and Fish Department, Phoenix, AZ.
- Nowak, R.M., and J.L. Paradiso. 1983. Walker's mammals of the world. 4th Ed. Vol. II. Johns Hopkins University Press, Baltimore, MD.
- Oberholser, H.C. 1974. The bird life of Texas. University of Texas Press. Austin, Texas. 1069 pp.
- Officer, J.E. 1993. Kino and agriculture in the Pimeria Alta. *Journal of Arizona History* 34:287-306.
- Organ Pipe Cactus NM. 2000. Threatened, endangered and sensitive species: Annual summary of activities. Resources Management Division, Organ Pipe Cactus National Monument, Ajo, Arizona.
- _____. 2001. Threatened, endangered and sensitive species: Annual summary of activities. Resources Management Division, Organ Pipe Cactus National Monument, Ajo, Arizona.
- _____. 2002. Threatened, endangered and sensitive species: Annual summary of activities. Resources Management Division, Organ Pipe Cactus National Monument, Ajo, Arizona.
- Paradiso, J.L., and R.M. Nowak. 1971. Taxonomic status of the Sonoran pronghorn. *Journal of Mammalogy* 52(4):855-858.
- Phelps, J.S. 1981. Habitat of the Sonoran pronghorn. In *The Sonoran Pronghorn*. Special Report No. 10. Arizona Game and Fish Department, Phoenix, AZ.
- Phillips, A.R., J. Marshall, and G. Monson. 1964. The birds of Arizona. University of Arizona

Pinkava, D.J. 1999. Cactaceae Cactus Family, Part Three. In: Vascular Plants of Arizona: Cactaceae - *Cylindropuntia*. Journal of the Arizona- Nevada Academy of Science 32(1):32-47.

Proudfoot, G. 1996. Natural history of the cactus ferruginous pygmy-owl. MS Thesis, Texas A & M University, Kingsville, Texas.

Proudfoot, G.A. and S.L. Beasom. 1996. Responsiveness of cactus ferruginous pygmy-owls to broadcasted conspecific calls. Wildl. Soc. Bull. 24:294-297.

Proudfoot, G.A., and R.R. Johnson. 2000. Ferruginous pygmy-owl. In A. Poole and F. Gill (eds.), The Birds of North America. Cornell Laboratory of Ornithology and The Academy of Natural Sciences, No. 498.

Proudfoot, G.A. and R.D. Slack. 2001. Comparisons of ferruginous pygmy-owl mtDNA at local and international scales. Report to Charles H. Huckelberry, Pima County, Contract Agreement #07-30-T-125759-0399.

Reed, J.M., P.D. Doerr, and J.R. Walters. 1986. Determining minimum population sizes for birds and mammals. Wildlife Society Bulletin 14:225-261.

Reichenbacher, F.W., and R.B. Duncan. 1989. Sanborn's bat and rare plant studies at Barry M. Goldwater Bombing Range, Yuma County, AZ. Final Report. F.W. Reichenbacher and Associates, Tucson, AZ.

Rhodes, O.E., C. Malone, and L. Cox. 2003. Genetic assessment of the Sonoran pronghorn using mitochondrial and nuclear DNA markers. Department of Forestry and Natural Resources, Purdue University, West Lafayette, Indiana.

Richter-Dyn, N., and N.S. Goel. 1972. On the extinction of a colonizing species. Theoretical Population Biology 3:406-433.

Rowlands, P.G. 2000. Low temperature and other climatic trends at Organ Pipe Cactus National Monument. In W.L. Halvorson and B.S. Gebow, eds., Creative Cooperation in Resource Management, extended abstracts. U.S. Geological Survey, Western Ecological Research Center, Sonoran Desert Field Station, University of Arizona, Tucson, AZ.

Rutman, S. 1997. Dirt is not cheap: livestock grazing and a legacy of accelerated soil erosion on Organ Pipe Cactus National Monument, Arizona. In J. M. Feller and D. S. Strouse, eds., Environmental, economic, and legal issues related to rangeland water developments. The Center for the Study of Law, Science and Technology, Arizona State University, Tempe,

- Samuel, M.D., and K.H. Pollock. 1981. Correction of visibility bias in aerial surveys where animals occur in groups. *Journal of Wildlife Management* 45(4):993-997.
- Scott, M.D. 1990. Determining a minimum genetically viable population size for Yellowstone pronghorns. *Proceedings Pronghorn Antelope Workshop* 14:26-27.
- Sheridan, T.E. 2000. Human ecology of the Sonoran Desert. In S.J. Phillips and P.W. Comus, eds., *A natural history of the Sonoran Desert*. Arizona-Sonora Desert Museum Press, Tucson, AZ.
- Sidner, R. 1999. Ninth annual monitoring report of bats, especially the lesser long-nosed bat (*Leptonycteris curasoae*), with emphasis upon roostsites on the Fort Huachuca Military Reservation, Cochise County, Arizona, May - October 1998. Report to Fort Huachuca, Arizona. Contract #DABT63-98-T-0093.
- Sidner, R. 2000. Report of activities under permit TE-821369-0. Report to the US Fish and Wildlife Service, Albuquerque, New Mexico.
- Sidner, R., and F. Houser. 1990. Lunarphilia in nectar-feeding bats in Arizona. *Bat Research News* 31(4):15.
- Slauson, L. 1996. Pollination ecology of *Agave chrysantha* and *Agave palmeri*. Pages 154-203. In *Amorphometric and Pollination Ecology Study of Agave chrysantha* Peebles and *Agave palmeri* Englem. (Agavaceae). Ph.D. Dissertation. Arizona State University. Tempe, Arizona.
- Slauson, L. 1999. Pollination biology of two chiropterophilous agaves in Arizona, Draft. Desert Botanical Garden, Phoenix.
- Sprunt, A. 1955. *North American birds of prey*. National Audubon Society, Harper and Brothers, New York. 227pp.
- State of Arizona. 1990. Final report and recommendations of the Governor's riparian habitat task force. Executive Order 89-16. Streams and riparian resources. October 1990. Phoenix, AZ. 28 pp.
- Sutton, G.M. 1951. *Mexican birds: First impressions based upon an ornithological expedition to Tamaulipas, Nuevo Leon and Coahuila*. Univ. of Oklahoma Press, Norman. 282pp.
- Swarth, H.S. 1914. A distributional list of the birds of Arizona. *Pac. Coast Avifauna* 10.
- Szaro, R.C. 1989. Riparian forest and scrubland community types of Arizona and New Mexico.

Desert Plants 9:70-138.

Tewes, M.E. 1995. Status of the ferruginous pygmy-owl in southern Texas and northeast Mexico. Proj. Rep. 2, Job 25, Texas Parks and Wildl. Dept. and Texas A&M Univ.-Kingsville.

Thompson, R.D., C.V. Grant, E.W. Pearson, and G.W. Corner. 1968. Cardiac response of starlings to sound: effects of lighting and grouping. *American Journal of Physiology* 214:41-44.

Turner, R.M. and D.E. Brown. 1982. Sonoran desertscrub. In D.E. Brown, ed., *Biotic communities of the American Southwest-United States and Mexico*. *Desert Plants* 4(1-4):181-222.

University of Arizona. 1995. Records from the University of Arizona Bird Collection. Provided by T. Huels.

U.S. Fish and Wildlife Service. 1982. Sonoran pronghorn recovery plan. United States Fish and Wildlife Service, Denver, CO.

U.S. Fish and Wildlife Service. 1988. Endangered and threatened wildlife and plants; determination of endangered status for two long-nosed bats. *Federal Register* 53(190):38456-3860.

U.S. Fish and Wildlife Service. 1995. Lesser long-nosed bat recovery plan. Albuquerque, New Mexico. 49pp.

U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; determination of endangered status for the cactus ferruginous pygmy-owl in Arizona. *Fed. Reg.* 62:10730-10747.

U.S. Fish and Wildlife Service. 1998a. Final revised Sonoran pronghorn recovery plan. United States Fish and Wildlife Service, Albuquerque, NM.

U.S. Fish and Wildlife Service. 1998b. Final programmatic environmental assessment for the future management of Cabeza Prieta National Wildlife Refuge and draft comprehensive conservation plan. United States Fish and Wildlife Service, Albuquerque, NM.

U.S. Fish and Wildlife Service. 1999. Endangered and threatened wildlife and plants; designation of critical habitat for the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). *Fed. Reg.* 64:37419-37440.

U.S. Fish and Wildlife Service. 2001. Draft recovery criteria and estimates of time for recovery actions for the Sonoran pronghorn: a supplement and amendment to the 1998 final revised Sonoran pronghorn recovery plan. United States Fish and Wildlife Service,

Albuquerque, NM.

- U.S. Fish and Wildlife Service. 2002. Endangered and threatened wildlife and plants; designation of critical habitat for the Arizona distinct population segment of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). Fed. Reg. 67: 71032-71064.
- U.S. Fish and Wildlife Service. 2003. Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) draft recovery plan. Albuquerque, NM. 164 pp. plus appendices.
- U.S. Immigration and Naturalization Service. 2001. Draft report, environmental assessment for the proposed expansion of the Ajo U.S. Border Patrol Station, Why, Arizona. Immigration and Naturalization Service, Washington D.C.
- U.S. General Accounting Office (USGAO). 1988. Public rangelands: some riparian areas restored but widespread improvement will be slow. Rep. to Congress. Requesters, U.S. General Accounting Office, Washington D.C.
- van Rossem. 1945. A distributional survey of the birds of Sonora, Mexico. Occasional Papers Mus. Zool., Louisiana State University. Baton Route, Louisiana. 379 pp.
- Villa, R.B. 1958. Partial account of Prof. Bernard Villa R. Concerning the study of bighorn sheep and antelope in northern Mexico. Inst. Biol., Mexico, D.F. Unpublished.
- Wauer, R.H., P.C. Palmer, and A. Windham. 1993. The ferruginous pygmy-owl in southern Texas. Am. Birds 47:1071-1075.
- Wilcox, R.L., S. Richardson, and D. Abbate. 1999. Habitat characteristics of occupied cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) sites at the suburban/rural interface of north Tucson, Arizona. Report to Arizona Game and Fish Dept., Phoenix, AZ.
- Wilcox, R.L., S. Richardson, and D. Abbate. 2000. Habitat selection by cactus ferruginous pygmy-owls in southern Arizona - preliminary results. Arizona Game and Fish Dept., Tucson, AZ. 13 pp.
- Wildeman, G., and J.H. Brock. 2000. Grazing in the southwest: history of land use and grazing since 1540. In R. Jemison and C. Raish, eds., Livestock management in the American southwest: ecology, society, and economics. Elsevier Science, Amsterdam, The Netherlands.
- Williams, E.S. and I.K. Barker, (eds). 2001. Infectious Diseases of Wild Mammals, 3rd Edition, Iowa State Press, Ames, IA.

- Workman, G.D., T.D. Bunch, J.W. Call, F.C. Evans, L.S. Neilson, and E.M. Rawlings. 1992. Sonic boom and other disturbance impacts on pronghorn antelope (*Antilocapra americana*). Report to the U.S. Air Force, Hill Air Force Base, UT.
- Wright, R.L., and J.C. deVos. 1986. Final report on Sonoran pronghorn status in Arizona. Contract No. F0260483MS143, Arizona Game and Fish Department, Phoenix, AZ
- Yoakum, J.D., B.W. O’Gara, and V.W. Howard, Jr. 1996. Pronghorn on western rangelands. In P.R. Krausman, ed., Rangeland wildlife. The Society for Range Management, Denver, CO.

Tables and Figures

Table 1. A summary of population estimates from literature and field surveys for Sonoran pronghorn in the U.S.

Date	Population estimate (95 percent CI ^a)	Source
1925	105	Nelson 1925
1941 ^b	60	Nicol 1941
1957	<1,000	Halloran 1957
1968	50	Monson 1968
1968-1974	50 - 150	Carr 1974
1981	100 - 150	Arizona Game and Fish Department 1981
1984	85 - 100	Arizona Game and Fish Department 1986
1992	179 (145-234)	Bright <i>et al.</i> 1999
1994	282 (205-489)	Bright <i>et al.</i> 1999
1996	130 (114-154)	Bright <i>et al.</i> 1999
1998	142 (125-167)	Bright <i>et al.</i> 1999
2000	99 (69-392)	Bright <i>et al.</i> 2001
2002	21 (18-33)	Bright <i>et al.</i> 2002

^a Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

^b Population estimate for southwestern Arizona, excluding Organ Pipe Cactus National Monument.

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Table 2. Comparison of U.S. Sonoran pronghorn population surveys, 1992-2002.

Date	Pronghorn observed		Population estimates		
	On transect	Total observed	Density estimate using DISTANCE (95 percent CI) ^a	Lincoln-Peterson (95 percent CI)	Sightability model (95 percent CI)
Dec 92	99	121	246 (103-584)	---	179 (145-234)
Mar 94	100	109	184 (100-334)	---	282 (205-489)
Dec 96	71	82 (95 ^b)	216 (82-579)	162 (4-324)	130 (114-154)
Dec 98	74	86 (98 ^b)	---	172 (23-321)	142 (125-167)
Dec 00	67	69 ^b	---	---	99 (69-392)
Dec 02	18	0	---	---	21 (18-33)

^a Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

^b Includes animals missed on survey, but located using radio telemetry.

Table 3. Population estimates from literature and field surveys for Sonoran pronghorn in Mexico.

Date	Population estimate (95 percent CI) ^a	Source
1925	595	Nelson 1925
1957	>1,000	Villa 1958
1981	200-350	Arizona Game and Fish Department 1981
1993	414 (317-644)	Bright <i>et al.</i> 1999
2000	346 (288-445)	Bright <i>et al.</i> 2001
2002	280 ^b	Bright <i>et al.</i> unpubl. data

^a Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

^b These estimates are tentative and confidence intervals have not yet been generated.

Table 4. Comparison of Sonoran pronghorn surveys iJuly 24, 2003n Mexico, 1993, 2000, and 2002.

	Total number of pronghorn seen	Sightability model (95 percent CI ^a)
<i>March 1993</i>		
Southeast of Highway 8	163	289 (226-432)
West of Highway 8	51	124 (91-211)
Total	214	414 (317-644)
<i>December 2000</i>		
Southeast of Highway 8	249	311 (261-397)
West of Highway 8	17	34 (27-48)
Total	266	346 (288-445)
<i>December 2002</i>		
Southeast of Highway 8	19	25 ^b
West of Highway 8	195	255 ^b
Total		

^a Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.

^b These estimates are tentative and confidence intervals have not yet been generated.

Table 5. Assessment of pygmy-owl habitat quality, boundary vehicle barrier project, Organ Pipe Cactus National Monument, AZ. Area measurements are for new ground-disturbing impact of main project corridor and staging/turnaround areas.							
Part 1: Sierra de Santa Rosa (Km 0.0 East) westward to east slope of Monument Hill (Km 20.8 East) (See Figure 3 for kilometer reference points). All in proposed critical habitat.							
From:	To:	Total length	Habitat quality and area				Notes
			Poor	Low	Moderate	High	
1.02 km 0.0 mi	1.06 km 0.66 mi	1.06 km 0.66 mi				0.643 ha 1.575 ac	Upper bajada: Dense desertscrub, numerous columnar cacti, trees.
1.07 km 0.66 mi	1.8 km 1.39 mi	1.19 km 0.73 mi				0.734 ha 1.812 ac	Moderate to Low: 2-3 saguaros per acre, mostly creosote on uplands.
1.9 km 1.39 mi	3.91 km 2.43 mi	1.66 km 1.04 mi		0.953 ha 2.353 ac			Low to Poor: ≤ 1 saguaro/acre. Open creosote uplands, few drainages.
3.91 km 2.43 mi	7.06 km 4.38 mi	3.15 km 1.95 mi		1.872 ha 4.622 ac			Low to Mod: Creosote bottomland w/ very few saguaros, some riparia areas w/ mesquite and paloverde
7.06 km 4.38 mi	7.99 km 4.96 mi	0.93 km 0.58 mi		0.561 ha 1.385 ac			Low to Poor: Creosote flat w/ large creosote. No saguaros.
7.99 km 4.96 mi	9.28 km 5.76 mi	1.29 km 0.80 mi				0.851 ha 2.101 ac	Mod to High(?): Bosque of mesquite, Lycium, large creosote, no saguaros
9.28 km 5.76 mi	10.9 km 6.77 mi	1.62 km 1.01 mi		1.111 ha 2.743 ac			Low: Very open scrub of creosote, saltbush, white bursage, few/no saguaros. Impacts of past ranching.
10.9 km 6.77 mi	15.10 km 9.38 mi	4.20 km 2.61 mi	2.610 ha 6.444 ac				Poor to Low: Open saltbush flats, some creosote, saguaros 200-300m apart. Impacts of past ranching, current border crossing
15.10 km 9.38 mi	18.40 km 11.43 mi	3.30 km 2.05 mi		2.339 ha 5.775 ac			Low to Mod (?): Saltbush flats w/ small riparian stringers. Few saguaros. Last 1km heavily impacted (border crossing) and developed (Lukeville)
18.40 km 11.43 mi	20.8 km 12.85 mi	2.40 km 1.42 mi				1.510 ha 3.728 ac	Mod to Low: Lukeville, mixed desertscrub w/ saltbush, saguaros, some washes. Border-crossing impacts.
Totals:			2.610 ha 6.444 ac	6.836 ha 16.878 ac	3.095 ha 7.641 ac	0.643 ha 1.575 ac	13.184 ha 32.551 ac

Table 5. Continued. Assessment of pygmy-owl habitat quality, boundary vehicle barrier project, Organ Pipe Cactus National Monument, AZ. Area measurements are for new ground-disturbing impact of main project corridor and staging/turnaround areas.							
Part 2: West slope of Monument Hill (Km 0.0 West) westward to southwestern corner of Organ Pipe Cactus NM (See Figure 3 for kilometer reference points). Proposed critical habitat extends from Km 0.0 to approximately Km 2.0. Mexico Highway 2 is 100m south of all reaches beyond Km 2.0.							
From:	To:	Total length	Habitat quality and area impacted				Notes
			Poor	Low	Moderate	High	
1.02 km 0.0 mi	2.07 km 1.28 mi	2.07 km 1.28 mi				1.268 ha 3.130 ac	High to Moderate: Arborescent desertscrub, high density of trees and saguaros. <i>End of proposed critical habitat.</i>
2.07 km 1.28 mi	6.50 km 4.03 mi	4.43 km 2.75 mi				2.646 ha 6.532 ac	High to Moderate: Arborescent desertscrub, high density of trees and saguaros, some more open areas. Some border-crossing impacts.
6.50 km 4.03 mi	9.24 km 5.74 mi	2.74 km 1.71 mi			1.567 ha 3.869 ac		Middle baja da deserstrub, some open areas, some more dense. Some border-crossing impacts.
9.24 km 5.74 mi	11.0 km 6.83 mi	1.76 km 1.09 mi			1.058 ha 2.612 ac		Mod to Low: Thinning desertscrub, phasing into open saltbush.
11.0 km 6.83 mi	12.8 km 8.01 mi	1.8 km 1.183 mi	1.850 ha 4.567 ac				Poor to Low: Saltbush-cholla flats, and "Coyote Hill" with steep cholla slopes.
12.80 km 8.01 mi	16.00 9.94 mi	3.20 km 1.93 mi			1.785 ha 4.407 ac		Mod to Low: Saltbush desertscrub w/ much ironwood and saguaro. Open saltbush flats, also bottomland thickets.
16.00 km 9.94 mi	16.5 0km 10.25 mi	0.50 km 0.31 mi				0.275 ha 0.679 ac	High: Bosque of Aguajita Wash (mesquite, wolfberry, desert caper)
16.50 km 10.25 mi	17.30 km 10.75 mi	0.80 km 0.49 mi		0.510 ha 1.259 ac			Low stature open deserstrub on rocky Quitobaquito Hills
17.30 km 10.75 mi	17.60 km 10.93 mi	0.30 km 0.18 mi				0.165 ha 0.407 ac	High: Bosque at Quitobaquito (muesquite, wolfberry, acacia, paloverde). Border-crossing impacts.
17.60 km 10.93 mi	20.60 km 12.79 mi	3.00 km 1.87 mi		1.870 ha 4.617 ac			Low: Open saltbush flats with chain-fruit cholla.
20.60 km 12.70 mi	21.90 km 13.60 mi	1.30 km 0.90 mi				0.715 ha 1.765 ac	Mod to High(?)Edge of Rio Son oya bosque: mesquite, large creosote, interspersed w/ cholla, saguaro, saltbush.
21.90 km 13.60 mi	22.70 km 14.10 mi	0.80 km 0.50 mi		0.500 ha 1.234 ac			Low to Poor: Sparse desertscrub on rocky hills (Cerro Blanco).
22.70 km 14.10 mi	23.70 km 14.72 mi	1.00 km 0.621 mi		0.62 ha 1.530 ac			Low: Open sparse desertscrub.
Totals:			1.850 ha 4.567 ac	3.500 ha 8.642 ac	4.410 ha 10.888 ac	5.069 ha 12.515 ac	14.829 ha 36.612 ac

APPENDIX

CONCURRENCE

Quitobaquito pupfish (*Cyprinodon eremus*)

Status and Environmental Baseline

In Arizona, the genus *Cyprinodon* was historically comprised of two recognized subspecies, (*C. m. macularius*) and (*C. m. eremus*), and an undescribed species, the Monkey Spring pupfish. The desert pupfish subspecies are now recognized as separate species, the desert pupfish (*Cyprinodon macularius*) and the Quitobaquito pupfish (*C. eremus*) (Echelle *et al.* 2000), and the undescribed form has since been described and renamed the Santa Cruz pupfish (*C. arcuatus*) (Minckley *et al.* 2002). The desert pupfish and Quitobaquito pupfish were listed as endangered species with critical habitat on April 30, 1986, (US Fish and Wildlife Service 1986 [51 FR 10842]). Critical habitat was designated in Arizona at Quitobaquito Springs in Pima County and in California along parts of San Felipe Creek, Carrizo Wash, and Fish Creek Wash. The Mexican government has also listed the species as endangered [Secretaria de Desarrollo Urbano y Ecología (SEDUE) 1991].

Although the Quitobaquito pupfish has only recently been described as a species distinct from its sister species, the desert pupfish, it has long been recognized as a distinct form (Miller 1943, Hubbs and Miller 1948, Minckley 1973, Miller and Fuiman 1987). The species is endemic to Quitobaquito springs and pond, Organ Pipe Cactus National monument, Pima County, Arizona, and the nearby Rio Sonoyta, in northern Sonora, Mexico (Echelle *et al.* 2000). Their general morphology is similar to the desert pupfish: a small fish, less than 3 inches long, the body is thickened, chubby or strongly laterally compressed in males; coloration is a silvery background with narrow dark vertical bars on the sides. Males are larger than females and become bright blue during the breeding season (Miller 1943, Minckley 1973). Quitobaquito pupfish differ from desert pupfish in having a deeper head and body, a more posterior dorsal fin origin, and pelvic fins that are reduced in size, and in having less yellow coloration in the caudal region of breeding males (Miller 1943, Miller and Fuiman 1987, Echelle *et al.* 2000).

The historical distribution of Quitobaquito pupfish was similar to its current distribution, with the exception that it no doubt occurred in a much longer reach of the Rio Sonoyta. Surface water impoundments and diversions and groundwater withdraw for increasing agricultural and municipal water use throughout the last century altered the flow regime, eroded streambanks of the Rio Sonoyta, and lowered water tables, which undoubtedly dried it considerably and greatly reduced habitat. As a result, today, today the Quitobaquito pupfish occurs only in an approximately 1-2 kilometer long reach of the Rio Sonoyta approximately 20 kilometers west of the town of Sonoyta, and in Quitobaquito pond and spring channel at Organ Pipe Cactus National Monument. The subsurface aquifer of Aguajita Wash provides water for more than five springs and seeps in the Quitobaquito area, from Aguajita Springs on the southeast to Williams Spring

more than 1 ½ miles to the northwest (Carruth 1996). All these springs and the Aguajita aquifer are hydrologically linked. The Quitobaquito pond is lined with plastic, but has dense riparian vegetation surrounding it.

Additionally, the Quitobaquito pupfish has been affected by the application of pesticides in agricultural areas of the Rio Sonoyta valley, and the introduction of the non-native fish species, black bullhead (*Ictalurus melas*) and mosquito fish (*Gambusia affinis*) (McMahon and Miller 1982, Hendrickson and Varela 1989). There is also a concern that introduced salt cedar (*Tamarisk* spp.) next to pupfish habitat may cause a lack of water at critical times (Bolster 1990; R. Bransfield, US Fish and Wildlife Service, pers. comm., 1999). Evapotranspiration by luxuriant growths of this plant may especially impact smaller habitats where water supply is limited. The remaining populations continue to face these threats, primarily due to increasing groundwater withdraw and the potential introduction of non-native predators

About 5 transplanted refugia populations of Quitobaquito pupfish exist, although none of these are “wild” or self-sustaining (US Fish and Wildlife Service files). The future of the species depends heavily upon future developments in water management of the Rio Sonoyta valley in Mexico. Additional life history information can be found in the recovery plan (US Fish and Wildlife Service 1993a) and other references cited there.

NPS staff carry out annual monitoring of Quitobaquito pupfish. The results of the census for recent years are provided in the Biological Assessment for this project (NPS 2003). Statistical values should be viewed cautiously, as the census is intended as a general index, not a rigorous population sample. With that in mind, captures in 2002 were less than one standard deviation below the mean of captures in 1992-1996 and 2000 – 2001. 2002 captures were approximately half those of 1995 and 1996, but were slightly higher than 2000 and 2001. The 2002 census suggests that the current population is above the low levels reached in 1992 and 1994 (and some years in the 1980s), but not at the high levels of 1995-1996. The apparent population reduction that took place between 1996 and 2000 may or may not be in the range of normal fluctuation. No causative factors were identified. No nonnative fish have been detected in the weekly visual inspections and the periodic trapping sessions specifically targeting non-native fish. None have been documented since 1993, when a catfish (*Ictalurus melas*) was caught and removed from the southwest spring. Based on total pupfish captures and subjective observations of pupfish remaining in the system after sampling, we estimate that Quitobaquito contained at least 3,500 pupfish in September 2002. The apparent population reduction since the mid-1990s causes moderate concern.

Proposed Action and Effects

The proposed vehicle barrier would pass approximately 300 feet south of the edge of Quitobaquito Pond, and would pass through the mesquite-wolfberry bosque associated with Quitobaquito (see the biological opinion for more detailed discussion).

Bedrock is as shallow as 18 inches (45 cm) along the boundary line at Quitobaquito, so holes for most of the vertical supports will be drilled into bedrock. Drilling into the shallow bedrock granite and gneiss in the Aguajita-Quitobaquito area may affect this aquifer, with resulting effects on springflow into Quitobaquito Pond. However, this potential impact may be offset by the concrete that will be placed in drill holes to anchor the vertical supports. Due to the proximity of the project to Quitobaquito, any spills or leaks of petroleum products, solvents, or other contaminants could pose a threat to the pupfish. Construction activities, such as rock drilling and welding steel, could ignite a wildfire at Quitobaquito. Wildfire in the thickets surrounding Quitobaquito would be difficult to control and could pose a threat to the pupfish. A fire could be likely to carry from the pond up the entire length of the channel. Such a fire could possibly kill significant numbers of pupfish from heat, at least in the shallow channel. Subsequent ash input into the system may further harm the surviving fish.

The vehicle barrier will eliminate or reduce the ability of vehicles to cross the international border illegally at Quitobaquito. Without the barrier, a vehicle can potentially drive from Mexico Highway 2 right to the edge of Quitobaquito Pond, and then unload large volumes of contaminants, or non-native fish. Constructing the project will result in creating a gap approximately 30 feet wide, in the mesquite tree canopy along the international boundary at Quitobaquito. This gap will serve to some degree as a firebreak. Currently, wildfire could spread from informal campsites and smuggler/UDA staging areas with the mesquite bosque on the Mexican side, to the bosques and woodlands surrounding Quitobaquito. Such fire could have detrimental effects on pupfish and other natural resources

To avoid adverse impacts, NPS has included the following conservation measures as part of the proposed action:

- All construction activities, impacts, and equipment will be kept strictly within 30 feet of the international border. This will keep activities approximately 200 feet (61 m) from the southern edge of the pond.
- No water will be taken from the Quitobaquito system for any project-related purpose.
- Prior to drilling holes for upright supports, a geohydrologist familiar with the published research on Quitobaquito geohydrology, will evaluate the project design and methods, to determine whether there is a risk that drilling the project bore holes may affect the subsurface hydrology. If the geohydrologist determines that there may be a concern, actions will be considered and implemented if necessary, including:
 - Using some other method of installing barriers (such as Normandy barriers).
 - Re-excavating the Springs to mitigate any reduction in stream flow (the two springs that are capped need to be re-excavated approximately every 10 years due to plant roots occluding the pipes).

- To prevent chemical contamination and miscellaneous anthropogenic impacts, no project staging will take place at Quitobaquito, e.g. no cement mixing, washing or refueling equipment, etc. Also, there will be no storage of materials, vehicles, or fuel within 500 feet (152 m) of Quitobaquito.
- Dust abatement measures will be used within 0.5 mile (800 m) of Quitobaquito, using non-toxic, neutral means (e.g. water).
- To prevent danger of wildfire, project workers will observe a “no smoking” area within 500 feet (152) of Quitobaquito. A fire suppression crew will be present, fully equipped, during the time that construction passes through the Quitobaquito area. Also, all vegetation that is cut to make room for construction will be removed from the area immediately and in its entirety. It will be salvaged as firewood, taken to the Organ Pipe Cactus NM brush dump, or otherwise removed from the project area.

We concur that the proposed actions of the Vehicle Barrier project is not likely to adversely affect the Quitobaquito pupfish or critical habitat.

We present this concurrence based on the above analysis and the following considerations:

- It is highly unlikely that drilling will impact the pond since it is lined.
- The possibility of water contamination from chemicals, dust or fire is unlikely because of the restrictions for fire, materials storage, and chemical use will not occur near the pond or spring.
- A geohydrologist will inspect the area before activities proceed, and alternative methods of barrier installation will be used if necessary.

Our concurrence is based on full implementation of the project as described in the Description of the Proposed Action section of the Biological Opinion and this Appendix, including any conservation measures incorporated into the project design. In the unlikely event that impacts to the pupfish or its critical habitat may occur in the future, your determination and our concurrence may need to be reconsidered.

Literature Cited

Bolster, B.C. 1990. Five year status report for desert pupfish, *Cyprinodon macularius macularius*. California Department of Fish and Game, Inland Fisheries Division, Endangered Species Project, Rancho Cordova, California.

Echelle, A.A., R.A. van den Bussche, T.P. Malloy, Jr., M.L. Haynie, and C.O. Minckley. 2000.

- Mitochondrial DNA variation in pupfishes assigned to the species *Cyprinodon macularius* (Atherinomorpha: Cyprinodontidae): Taxonomic implications and conservation genetics. *Copeia* 2000(2):353-364.
- McMahon, T.E. and R.R. Miller. 1982. Status of the fishes of the Rio Sonoyta basin, Arizona and Sonora, Mexico. *Proceedings of the Desert Fishes Council* 14th: 237-245.
- Miller, R.R. 1943. The status of *Cyprinodon macularius* and *Cyprinodon nevadensis*, two desert fishes of western North America. *Occas. Papers Museum Zool., Univ. of Mich.* 473:1-25.
- Miller, R.R., and L.A. Fuiman. 1987. Description and conservation status of *Cyprinodon macularius eremus*, a new subspecies of pupfish from Organ Pipe Cactus National Monument, Arizona. *Copeia* 1987(3):593-609.
- Minckley, W.L. 1973. *Fishes of Arizona*. Arizona Game and Fish Dept., Phoenix. 293 pp.
- Minckley, W.L., Robert Rush Miller, and Steven Mark Norris. 2002. Three new pupfish species, *Cyprinodon* (Telostei, Cyprinodontidae), from Chihuahua, Mexico, and Arizona, USA." *Copeia*. Vol. 2002, No. 3. pp. 687-705.
- National Park Service. 2003. Biological assessment—international boundary vehicle barrier, Organ Pipe Cactus National Monument, Arizona. Organ Pipe Cactus National Monument, Ajo, AZ. 45pp.
- Secretaria de Desarrollo Urbano y Ecología [SEDUE]. 1991. Acuerdo por el que se establecen los criterios ecologicos CT-CERN-001-91 que determinan las especies raras, amenazadas, en peligro de extencion o sujetas a proteccion especial y sus endemismos de la flora y la fauna terrestres y acuaticas en la Republica Mexicana. *Gaceta Ecologica* 15:2-27.
- U.S. Fish and Wildlife Service. 1986. Endangered and threatened wildlife and plants; determination of endangered status and critical habitat for the desert pupfish. *Federal Register* 51:10842-10851.
- U.S. Fish and Wildlife Service. 1993. Desert pupfish recovery plan. Phoenix, Arizona. 67 pp.