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In Reply Refer To:

AESO/SE  
02-21-05-F-0262

July 12, 2005

Memorandum

To: Acting Regional Director, Bureau of Indian Affairs, Western Regional Office,  
Phoenix, Arizona

From: Field Supervisor

Subject: Biological Opinion for the Construction of Route 232 on Tohono O'odham  
Nation, Pima County, Arizona

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated January 7, 2005, and received by us on January 14, 2005. At issue are impacts that may result from your proposed road construction on Bureau of Indian Affairs (BIA) Route 232, located approximately 21 miles west of Sells, Pima County, Arizona. The proposed project will take place within the boundaries of the Tohono O'odham Nation (TON). The proposed action may affect the endangered cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*; pygmy-owl). You have also determined that the project may affect, but is not likely to adversely affect, the lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*). Our concurrence can be found in Appendix A.

This biological opinion (BO) will address the potential effects of the proposed action on the pygmy-owl and is based on: (1) information provided in the January 2005 Biological Assessment (BA) prepared by the BIA; (2) a February 14, 2003, site visit with the BIA and TON; (3) additional information provided in a February 2, 2005, letter from BIA; and (4) other sources of published and unpublished information. Literature cited in this BO is not a complete bibliography of all literature available on the pygmy-owl, the effects of road construction, or on other subjects considered in this BO. A complete administrative record of this consultation is on file at this office. We have assigned log number 02-21-05-F-0262 to this project. Please refer to that number in future correspondence on this consultation.

## **BIOLOGICAL OPINION**

### **Consultation History**

- February 14, 2003: Site visit to discuss project and potential effects to the pygmy-owl.
- January 7, 2005: We received the BA and request for formal consultation.
- February 2, 2005: BIA provided revisions to their January 2005 BA.
- March 3, 2005: We sent our 30-day letter to BIA indicating the formal consultation had been initiated.
- June 22, 2005: Draft BO sent to BIA.
- July 11, 2005: Received comments from BIA

### **Description of the Proposed Action**

The BIA is proposing to upgrade 9.3 miles of existing dirt road known as BIA Route 232, located on the TON, near the geographic center of the Nation southeast of the intersection of State Route (SR) 86 and BIA Route 15 at Quijotoa. The roadway provides access to the villages of Sikul Himatk and San Luis. The primary purpose of the road project is to provide safe, all-weather access to Sikul Himatk.

The proposed action would consist of constructing a standard 26-foot, bituminous-surfaced road by grading and draining the existing road, and applying a double-chip surface coat for the entire length of the road. The finished road would include two 12-foot travel lanes and 1-foot surfaced outside shoulders. Construction outside of the existing road would only be for the purpose of complying with Federal design standards for minimum curves, tangents, and grades and to construct drainage features.

The average construction limit north and south of the road is 72 feet in width for a total of approximately 81.16 acres. Much of the existing road is inside of the construction limits and 23.19 acres are already disturbed. Total new disturbance would total approximately 58 acres. The total number of saguaros inside the construction limits is 139.

The proposed action will make use of the existing Quijotoa Material Source Pit, located approximately 0.75 mile east of BIA Route 15. Expansion of the pit will be required and would likely encompass an additional 3.4 acres. A total of three saguaros will be affected in this area.

Road construction will start between August 1, 2007, and February 1, 2008. The prime and double chip-seal surface coat will be applied during a four-week period sometime between May 15 and October 15, 2008.

### Conservation Measures

The BIA has included a number of conservation measures within the project description. They have committed to implement the following conservation measures in order to minimize the potential effects of this project on the pygmy-owl:

- Pygmy-owl surveys will be completed in 2006 and for each successive year in which construction is planned.
- All construction activities will be confined to the period between August 1 and February 1. These timing limits will become part of the Construction Specification Special Provisions.
- The areas inside the staked construction limits will not be completely cleared and grubbed. Saguaros that are near the perimeter will be left in place, undisturbed. Individual saguaros beyond the minimum 10-foot clearance zone, and not in a cut and fill section, will be left in place if at all possible. Saguaros at the very toe of fill slopes will be left intact, and fill will be placed around them, up to one foot in depth. These measures are designed to minimize the number of saguaros that have to be transplanted.
- The Contractor will be briefed on the sensitivity of the flora and fauna in the area. Vehicles and equipment will not be allowed to travel beyond that distance absolutely necessary to construct the road. All saguaros beyond the construction zone are to be avoided.
- The Contractor will salvage and relocate all transplantable saguaros prior to the start of clearing. When complete, the Contractor will indicate remaining “leave in place” saguaros with lath marked with high-visibility paint.
- All disturbed areas will be seeded with a native seed mix that includes low growing brush species.

### **Status of the Species/Critical Habitat**

A detailed description of the life history and ecology of the 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 website ([arizonaes.fws.gov](http://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 information developed in Texas and elsewhere may require qualification.

### Species Description

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 occurs 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.

### Listing and Critical Habitat

The Arizona population of the pygmy-owl was listed as an endangered distinct population segment on March 10, 1997, (USFWS 1997) without critical habitat. In response to a court order, approximately 731,712 acres of critical habitat were designated on July 12, 1999, (USFWS 1999) in areas within Pima, Cochise, Pinal, and Maricopa counties in Arizona. On January 9, 2001, a coalition of plaintiffs filed a lawsuit with the District Court of Arizona challenging the validity of the listing of the Arizona population of the pygmy-owl as an endangered species and the designation of its critical habitat. On September 21, 2001, the Court upheld the listing of the pygmy-owl in Arizona but, at our request, and without otherwise ruling on the critical habitat issues, remanded the designation of critical habitat for preparation of a new analysis of the economic and other effects of the designation (National Association of Home Builders *et al.* v. Norton, Civ.-00-0903-PHX-SRB). The Court also vacated the critical habitat designation during the remand. We published a proposed rule to redesignate critical habitat in the Federal Register on November 27, 2002 (USFWS 2002). The proposal includes approximately 1,208,000 acres in portions of Pima and Pinal counties, Arizona.

The plaintiffs appealed the District Court’s ruling on the listing of the pygmy-owl as a distinct population segment. On August 19, 2003, the Ninth Circuit Court of Appeals rendered an opinion regarding this appeal which held that, although we did not arbitrarily find the Arizona pygmy-owl population to be discrete, we arbitrarily found the discrete population to be significant. The judgment of the District Court was reversed and the case was remanded to the district court for further proceedings consistent with the Ninth Circuit’s opinion (No. 02-15212, CV 00-0903-SRB). The District Court ruled on June 28, 2004, remanding the Listing Rule to us for further proceedings consistent with that order and the opinion of the Court of Appeals for the Ninth Circuit. The Listing Rule was left in place pending the outcome of our reconsideration. We provided a required status report to the Court in January 2005, indicating that we were working on an assessment of the listing using the best information available. No additional guidance has been provided by the Court.

Because conservation and recovery of the pygmy-owl may rely upon a landscape mosaic of appropriate habitat, we have proposed critical habitat areas that will link a network of State, private, and Federal lands. The proposed system of critical habitat is designed to provide an interconnected system of suitable habitat essential to Arizona pygmy-owl survival and to maintain the viability of groups of pygmy-owls that are dependant upon continued genetic interchange and population immigration. Two premises were considered in proposing this system: 1) protecting verified pygmy-owl sites and areas with the presence of one or more of the constituent elements within the mean straight-line dispersal distance (8 km (5 mi)) from nest

sites and three of the four recovery team-recommended Special Management Areas (SMAs); and 2) providing for the linkage of these verified sites with areas of suitable habitat for which we have adequate scientific information indicating that they are essential to the conservation of the listed population and in need of special management. A complete description of the primary constituent elements of proposed critical habitat and the proposed critical habitat units can be found in the proposed rule (USFWS 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 for public comment in January 2003 (USFWS 2003). Following consideration of the public comments and depending on the resolution of listing litigation, we will work to finalize the recovery plan.

### Life History

Pygmy-owls are considered non-migratory throughout their range. There are winter (November through January) pygmy-owl location records from throughout its historical range in Arizona (University of Arizona 1995, Tibbitts 1996, Abbate *et al.* 1999, 2000). These winter records suggest that pygmy-owls are found within Arizona throughout the year and do not appear to migrate seasonally.

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. Pygmy-owls are most vocal and responsive during the courtship and nesting period (February through June). Male pygmy-owls establish territories using territorial-advertisement calls to repel neighboring males and attract females. 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 criterion 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). Recent information from Arizona indicates nests were located in cavities in saguaro cacti for all but two of the known nests documented from 1996 to 2002 (Abbate *et al.* 1996, 1999, 2000, AGFD 2003). A nest in an ash tree and a nest in a eucalyptus tree were the only non-saguaro nest sites (Abbate *et al.* 2000).

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 2003). Therefore, it is important that habitat characteristics within territories and home ranges be maintained over time in order for them to remain suitable. This is important for established pygmy-owl sites, as well as new sites that may be established by dispersing pygmy-owls. Pygmy-owls are more likely to be affected by projects within their home ranges because of the species' strong site fidelity.

Behaviorally, the option for resident pygmy-owls to seek alternative areas outside of the home range appears limited, at least for males.

Data on the size of areas used by pygmy-owls on an annual basis in Arizona are limited. Most telemetry data are gathered during the breeding season due to increased capture success and the limited battery life of transmitters. 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 areas up to 279 acres in the winter. Proudfoot and Johnson (2000) indicate that 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, pers. comm.). Therefore, we consider a 280-acre home range 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 horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), screech owls (*Otus kennicottii*), and domestic cats (*Felis domesticus*) (Abbate *et al.* 2000, AGFD 2003). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999).

Vegetation communities that provide a diversity of structural layers and plant species likely contribute to the availability of prey for pygmy-owls (Wilcox *et al.* 2000). Pygmy-owls also utilize different groups of prey species on a seasonal basis. For example, lizards, small mammals, and insects are utilized as available during the spring and summer during periods of warm temperatures (Abbate *et al.* 1999). However, during winter months, when low temperatures reduce the activity by these prey groups, pygmy-owls likely turn to birds as their primary source of food and appear to expand their use area in response to reduced prey availability (Proudfoot 1996). Therefore, 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.

Freestanding water does not appear to be necessary for the survival of pygmy-owls. During many hours of research monitoring, pygmy-owls have never been observed directly drinking water (Abbate *et al.* 1999, AGFD 2003). 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. The availability of water may contribute to improved vegetation structure and diversity, which improves cover availability. The presence of water also likely attracts potential prey species improving prey availability.

## Habitat

Pygmy-owls were historically recorded in association with riparian woodlands in central and southern Arizona (Bendire 1892, Gilman 1909, Johnson *et al.* 1987, Johnson *et al.* 2003). Plants present in these riparian communities included cottonwood (*Populus fremontii*), willow (*Salix* spp.), ash (*Fraxinus velutina*), and hackberry (*Celtis* spp.). However, recent records have documented pygmy-owls in a variety of vegetation communities such as riparian woodlands, mesquite (*Prosopis velutina*) bosques (Spanish for woodlands), Sonoran desertscrub, semidesert grassland, and Sonoran savanna grassland communities (see Brown 1994 for a description of these vegetation communities).

In recent years, pygmy-owls have been primarily found in the Arizona Upland Subdivision of the Sonoran desert, particularly Sonoran desertscrub (Phillips *et al.* 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnsgard 1988). It is described as a low woodland of leguminous trees with an overstory of columnar cacti and with one or more layers of shrubs and perennial succulents. Within the United States, columnar cacti include either saguaros (*Carnegiea gigantea*), or organ pipe cactus (*Stenocereus thurberi*). Trees within this subdivision include blue paloverde (*Parkinsonia florida*), foothills paloverde (*P. microphylla*), ironwood (*Olneya tesota*), mesquites (*Prosopis* spp.), and acacia (*Acacia* spp.). The paloverde-cacti mixed scrub series is described as developed on the bajadas and mountainsides away from valley floors. A list of plant and wildlife species associated within this subdivision can be found in Appendix II of Brown (1994), and is incorporated herein by reference.

While there are hundreds of thousands of acres of Sonoran Desertscrub, not all of this plant community is vegetatively suitable for pygmy-owls. Preliminary habitat assessment data appear to indicate that those areas of Sonoran Desertscrub characterized by high plant species diversity, high structural diversity, and the presence of tall canopy are the areas being used by pygmy-owls (Wilcox *et al.* 2000, Flesch 2003a). These areas are typically located along drainages and wash systems, or in areas with better soil and moisture conditions such as bajadas. The occurrence of these areas is more limited than the overall distribution of Sonoran Desertscrub.

In addition to Desertscrub, pygmy-owls have also been found in riparian and xeroriparian communities and semidesert grasslands as classified by Brown (1994). An abundance of saguaros or large trees and a diversity of plant species and vegetation strata characterize occupied Desertscrub communities. In Arizona, grassland communities often transition into desertscrub, which results in the availability of some saguaros for nesting.

While plant species composition differs among these communities, there are certain unifying characteristics such as the presence of vegetation in fairly dense thickets or woodlands, the presence of trees, saguaros, or organ pipe cactus large enough to support cavities for nesting, and elevations below 1,200 meters (m) (4,000 feet (ft)) (Swarth 1914, Karalus and Eckert 1974, Monson and Phillips 1981, Johnsgard 1988, Enriquez-Rocha *et al.* 1993, Proudfoot and Johnson 2000). Large trees provide canopy cover and cavities used for nesting, while the density of mid- and lower-story vegetation provides foraging habitat and protection from predators, and it contributes to the occurrence of prey items (Wilcox *et al.* 2000). Perch substrates used by

pygmy-owls for calling are typically the tallest trees available within a home range, though pygmy-owls have also been noted calling from within saguaro cavities (Flesch 2003a).

The density of trees and the amount of canopy cover preferred by pygmy-owls in Arizona has not been fully defined. However, preliminary results from a habitat selection study indicate that nest sites tend to have a higher degree of canopy cover and higher vegetation diversity than random sites (Wilcox *et al.* 2000). Overall vegetation density may not be as important as patches of dense vegetation with a developed canopy layer interspersed with open areas. Vegetation structure may be more important than species composition (Wilcox *et al.* 1999, Cartron *et al.* 2000a). Flesch (1999) indicated that areas with large trees and canopy coverage are likely important areas for pygmy-owls in the Altar Valley, though the author also noted (Flesch 2003a) that the presence of large, columnar cacti was also a potentially critical factor due to a greater availability of cavities relative to broadleaf trees. Riparian and xeroriparian (dry washes) areas, which are often used by pygmy-owls, are generally characterized by increased vegetation layers, higher plant diversity and larger tree sizes because of increased moisture availability.

### Species Status and Distribution

Only the Arizona population of the pygmy-owl is listed as an endangered species (USFWS 1997). 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, the pygmy-owl, prior to the mid-1900s, 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 (Hunter 1988, AGFD 2002a).

Documentation of the total number of pygmy-owls and their current distribution in Arizona is incomplete. This is due to the lack of systematic or comprehensive surveys throughout the pygmy-owl's historical range in Arizona, and respect for Tohono O'odham Nation's request to keep information related to pygmy-owls on the TON within tribal control. Survey and monitoring work in Arizona resulted in documenting an average of about 29 adult pygmy-owls per year over the past six years (1999 – 2004). Over this same period, an average of eight nests per year has been recorded. In 2004, we documented a total of 20 adult pygmy-owls and only four nests, a continuation of the low numbers observed in 2003. For comparison, the highest number of adult pygmy-owls recorded for a single year was 37 in 1999, and the most nests documented in a single year was 13 in 2001 (AGFD 2002a)<sup>1</sup>. Most of the pygmy-owls have been distributed in four general areas: northwest Tucson, southern Pinal County, Organ Pipe Cactus National Monument, and the Altar Valley. We believe that more pygmy-owls exist in Arizona, but for the reasons mentioned above, we do not have complete information.

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<sup>1</sup> These figures do not include documented pygmy-owl locations on the Tohono O'odham Nation.

In addition, recent survey information has shown pygmy-owls to be more numerous in Mexico adjacent to and near the Arizona border than early information indicated (Flesch and Steidl 2000). There also exists considerable unsurveyed habitat on the TON 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 TON 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 pygmy-owls among groups of pygmy-owls in southern Arizona and northern Mexico resulting from the connectivity of suitable habitat. The extent to which pygmy-owls disperse across the U.S./Mexico border is unknown, but recent survey work indicates that pygmy-owls regularly occur along the border (Flesch and Steidl 2000, Flesch 2003b). However, addressing habitat connectivity and the movements of pygmy-owls within Arizona is a primary consideration in the analysis of this project due to the importance of maintaining dispersal and movement among pygmy-owl groups within Arizona.

The patchy, dispersed nature of the pygmy-owl populations in Arizona (Abbate *et al.* 2000) and Mexico (Flesch 2003b) suggests that the overall population may function as a metapopulation. A metapopulation is a set of subpopulations within an area, where movement and exchange of individuals among population segments is possible, but not routine. A metapopulation's persistence depends on the combined dynamics of the productivity of subpopulations, the maintenance of genetic diversity, the availability of suitable habitat for maintenance and expansion of subpopulations, and the "rescue" of subpopulations that have experienced local extinctions by the subsequent recolonization of these areas by dispersal from adjacent population segments (Hanski and Gilpin 1991, 1997). The local groups of pygmy-owls within Arizona may function as subpopulations within the context of metapopulation theory. However, more information is needed regarding the population dynamics of pygmy-owls in Arizona.

The ability and opportunity for pygmy-owls to disperse within population segments, as well as emigrate to adjacent population segments, is likely important for the long-term persistence of pygmy-owls in Arizona. Pygmy-owl dispersal patterns are just beginning to be documented. A banded juvenile in Arizona was observed in 1998 approximately 3.9 km (2.4 mi) from its nest site following dispersal. Five young monitored with radio telemetry during 1998 were recorded dispersing from 3.5 km (2.17 mi) to 10.4 km (6.5 mi) for an average of 5.9 km (3.6 mi) (Abbate *et al.* 1999). In 1999, 6 juveniles in Arizona dispersed from 2.3 km (1.4 mi) to 20.7 km (12.9 mi) for an average of 10 km (6.2 mi) (Abbate *et al.* 2000). In Arizona, the maximum documented dispersal distance documented prior to 2004 was 34.8 km (21.8 mi) (AGFD 2002b). However, monitoring of a dispersing female pygmy-owl in 2004 has revealed a total distance traveled of approximately 240 km (80 mi) (AGFD 2004), indicating that the dispersal potential for pygmy-owls may be much greater than originally documented.

Juveniles typically disperse from natal areas in July and August and do not appear to defend a territory until September. They typically fly from tree to tree instead of long flights, but may move up to 1.6 km (1 mi) 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. Once dispersing male pygmy-owls settle in a territory (the area defended by a pygmy-owl), they rarely make additional movements outside of their home range

(the area used on an annual basis). For example, spring surveys have found male juveniles in the same general location as observed the preceding autumn (Abbate *et al.* 2000). However, unpaired female dispersers may make additional movements that sometimes continue into the subsequent breeding season (AGFD 2003).

### Threats to the Species

In determining whether listing of the pygmy-owl was warranted, we were required under section 4(a)(1) of the ESA to consider five listing factors: a) the present or threatened destruction, modification, or curtailment of its habitat or range; b) overutilization for commercial, recreational, scientific, or educational purposes; c) disease or predation; d) the inadequacy of existing regulatory mechanisms; or e) other natural or manmade factors affecting its continued existence. We determined in the 1997 listing that the following three factors applied to the pygmy-owl - Arizona Distinct Population Segment (DPS) to the extent that endangered status is appropriate (USFWS 1997). Below we provide a brief summary of current threats to the species; a full discussion can be found in the final listing rule (USFWS 1997).

#### *Factor a - The present or threatened destruction, modification, or curtailment of the species habitat or range.*

The pygmy-owl is threatened by present and potential future destruction and modification of its habitat throughout a significant portion of its range in Arizona (Phillips *et al.* 1964, Johnson *et al.* 1979, Monson and Phillips 1981, Johnson and Haight 1985, Hunter 1988, Millsap and Johnson 1988). One of the most urgent threats to pygmy-owls in Arizona continues to be the loss and fragmentation of habitat (USFWS 1997, Abbate *et al.* 1999). The complete removal of vegetation and natural features required for many large-scale and high-density developments, and the increased fragmentation of habitat caused by urban sprawl, directly and indirectly affects the pygmy-owl within some portions of its range in Arizona (Abbate *et al.* 1999).

#### *Factor d - Inadequacy of existing regulatory mechanisms.*

Although the pygmy-owl in Arizona is considered non-migratory, it is protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712). The MBTA prohibits "take" of any migratory bird; however, unlike the ESA, there are no provisions in the MBTA preventing habitat destruction unless direct mortality or destruction of an active nest occurs. Other Federal and State regulations and policies such as the Clean Water Act, military policies (Barry M. Goldwater Range), National Park Service policy, and inclusion of the pygmy-owl on the State of Arizona's list of Species of Special Concern will not adequately protect the pygmy-owl in Arizona from further decline. There are currently no provisions under Arizona statute addressing the destruction or alteration of pygmy-owl habitat.

*Factor e - Other natural or manmade factors affecting its continued existence.*

- *Genetics* - Recent genetic research suggests that pygmy-owls in the action area show evidence of genetic separation from other populations in Arizona and Mexico (Proudfoot and Slack 2001).
- *Pesticides* - Application of pesticides and herbicides in Arizona occurs year-round, and these chemicals may pose a threat to the pygmy-owl.
- *Recreational Birding* - The pygmy-owl is highly sought by birders who concentrate at several of the remaining known locations of pygmy-owls in the United States. Oberholser (1974) and Hunter (1988) suggest that recreational birding may disturb pygmy-owls in highly visited areas, affecting their occurrence, behavior, and reproductive success.
- *Predation* - 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.
- *Human-related Mortality* - Direct and indirect human-caused mortalities (e.g., collisions with cars, glass windows, fences, power lines, domestic cats, etc.), while likely uncommon, are often underestimated, and probably increase as human interactions with pygmy-owls increase (Banks 1979, Klem 1979, Churcher and Lawton 1987). This may be particularly important in the Tucson area where pygmy-owls are located in proximity to urban development.

### Rangewide Trend

Data collection related to the pygmy-owl has only been consistent throughout the State for the past few years. Even with expanded survey efforts since the pygmy-owl was listed as endangered in 1997, there are still many areas within Arizona that have not been surveyed or for which survey efforts are inadequate. Because research has been conducted for only a few years and because research and survey efforts have not been comprehensive or random in nature, it is not possible to determine an exact population size or trend within Arizona. Additionally, the TON supports pygmy-owls, but complete information on the numbers and distribution of pygmy-owls on the Nation are not available. Given the historical distribution of pygmy-owls in Arizona, it is clear that they have declined throughout the State to the degree that they are now much more limited in distribution (Monson and Phillips 1981, Davis and Russell 1984, Millsap and Johnson 1988, Proudfoot and Johnson 2000, Johnson *et al.* 2003). Johnson *et al.* (2003) hypothesized that large-scale water development (damming and diversion of the Salt and Verde rivers) led to initial declines in species abundance and distribution in Maricopa County.

Information gathered over the past few years indicates that pygmy-owls occur in Arizona in low numbers and are patchily distributed across southern Arizona. They occur in four main areas of the State, and numbers found within each area tend to vary on an annual basis. The numbers of documented adult pygmy-owls and nest sites has declined substantially over the past three years. Although documented since 1996, no nesting was documented in northwest Tucson or in Organ Pipe Cactus National Monument (OPCNM) in 2003 and 2004. The number of pygmy-owls and

nests in Altar Valley has also declined. It is likely that the ongoing drought has influenced the survival and productivity of pygmy-owls in all areas of Arizona. However, when drought conditions no longer persist, the potential for pygmy-owl populations to rebound relatively quickly exists, particularly with support from the Mexican population. Pygmy-owls breed and reproduce during their first year (Proudfoot and Johnson 2002). The average number of young fledged per successful nest site is over three (AGFD 2003). Several nests have produced five fledglings (Abbate *et al.* 1999, 2000).

Information about populations of pygmy-owls in Mexico is limited. Based on personal observations and anecdotal information, Russell and Monson (1998) recorded no decline in numbers from Sonora, Mexico. However, the first systematic surveys for pygmy-owls in Sonora were conducted in 2000 and 2001. These surveys resulted in the detection of 524 pygmy-owls along 329 transects, covering 1,113 km (Flesch and Steidl 2000, Flesch 2003b). These pygmy-owls were detected from the international border south to the Sonora/Sinaloa border, with the exception of the area around Hermosillo where agricultural and buffelgrass conversion has impacted available habitat (Flesch 2003b). In 2000 and 2003, AGFD personnel documented, through the use of radio telemetry, the movement of two dispersing juvenile pygmy-owls into Mexico from nests just north of the international border (AGFD pers. comm.). However, while movement of pygmy-owls across the border likely occurs, we have little information regarding the extent to which this happens.

In addition, we are not aware of any management or conservation practices in Mexico that are directed towards pygmy-owls. The expansion of agricultural and urban land uses increases habitat loss and fragmentation in Mexico and the stability of pygmy-owl populations cannot be determined. In Mexico, millions of acres of Sonoran Desert and thornscrub are being converted to buffelgrass (*Pennisetum ciliaris*), which represents both a direct and an indirect loss of habitat because of invasion into adjacent areas and increased fire frequency and intensity (McLaughlin and Bowers 1982, Burquez-Montijo *et al.* 2002). Burquez and Yrizar (1997) state that, "Given the government subsidies to establish exotic introduced grasslands, to maintain large cattle herds, and to support marginal cattle ranching, the desert and thornscrub in Sonora will probably be replaced in the near term by ecosystems with significantly lower species diversity and reduced structural complexity, unless control measures are implemented." Such replacement is and will continue to affect pygmy-owl prey base and habitat availability.

The importance of the pygmy-owl population in Arizona to the segment of the overall pygmy-owl population occupying Sonoran desertscrub and semi-desert grasslands will increase as habitat is converted in Mexico. In order to reverse the current decline in the pygmy-owl population in Arizona, an influx of pygmy-owls from Mexico will likely be required. However, the long-term potential for Mexico to provide this source of immigrant pygmy-owls is uncertain. Therefore, the importance of existing Arizona pygmy-owl populations may increase if populations south of the border become imperiled.

Since listing in 1997, we have evaluated approximately 871 actions that have had potential effects to pygmy-owls. The number of actions we evaluate continues to go up every year. In addition, two Habitat Conservation Plans have been completed for pygmy-owls, and three large multi-species Habitat Conservation Plans are being developed which include the pygmy-owl as

the key species. As a reference for current levels of activity, in 2004, we evaluated 156 actions, including one emergency consultation, 49 informal consultations (these are actions that included sufficient measures to avoid or minimize impacts to the pygmy-owls so that the effects were insignificant or discountable), five formal consultations (these are actions where adverse effects to pygmy-owls are anticipated), and 101 technical assistance projects. Technical assistance is given for projects that have no Federal nexus. These actions have no legal requirement to follow the recommendations we provide and we have no way of monitoring if or to what extent the recommendations are incorporated. They may or may not contribute to the conservation of the pygmy-owl, but they certainly contribute to ongoing effects to pygmy-owl habitat. Already in 2005, we have evaluated 192 actions, including 2 emergency consultations, 21 informal consultations, six formal consultations, and 163 technical assistance projects.

While many of these actions evaluated since the listing of the pygmy-owl have had adverse effects on the pygmy-owl, it is important to note that none of these actions were authorized for lethal “take” of a pygmy-owl. We only anticipated “take” in the form of harm or harassment.

### **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 that 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 to assess the effects of the action now under consultation.

### 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). In the BA, no action area was specifically delineated. Considering potential direct effects related to habitat impacts and noise/activity disturbance within occupied pygmy-owl home ranges, and the indirect effects of habitat fragmentation and impediments to movements and dispersal, we have defined the action area for this project as the BIA R/W and the area within 600 meters of the right-of-way, along the 9.3 miles of the road.

### Environmental Setting

The action area lies between approximately 2,139 feet and 2,399 feet elevation in flat to gently rolling, sloping terrain in the Gu Oidak Valley, between the Quijotoa Mountains to the west and the South Comobabi Mountains to the east. No surface water or wetlands occur within the project limits.

The action area is within the foothill paloverde (*Parkinsonia microphylla*) - saguaro cacti (*Carnegiea gigantea*) dominated Arizona Upland Sonoran desertscrub vegetation community (Brown 1994). Large saguaros are abundant. Creosote (*Larrea tridentata*), triangle-leaf bursage

(*Ambrosia deltoidea*), prickly pear (*Opuntia* spp), and ocotillo (*Fouquieria splendens*) are scattered throughout the site. There were very few grasses present.

There are two medium-sized washes that cross the road between milepost 0.04 and 9.3, Sikul Himatk and San Luis. There are six unnamed ephemeral washes ranging in width from 2 to 75 feet. Of note are two washes at milepost 4.6 and 5.0. They are 75 and 48 feet in width respectively, and support a dense ribbon of palo verde and mesquite along the banks. Sikul Himatk Wash exists as an undefined sheet flow area and supports creosote, and San Luis Wash is wide with a rocky substrate, supporting mainly desert broom (*Baccharis sarothroides*).

The Quijotoa material pit is located in habitat dominated by palo verde and saguaro.

#### Factors Affecting Species Environment Within The Action Area

The proposed project is totally surrounded by TON lands. Previous consultations within the TON have been primarily limited to capital improvement, health, and welfare projects including road improvements, fiber optic lines, water lines, water treatment plants, farm operations, etc. Many of these projects are linear in nature, have primarily temporary impacts, or do not result in significant impacts to pygmy-owls or pygmy-owl habitat. All but two consultations have been informal in nature. The extent of residential and commercial development within the TON has been limited. Undeveloped areas within the town limits are common. Livestock grazing occurs within the action area on a year-round basis, but the numbers of livestock are limited, especially during the current drought. Typically, only one or two consultations per year occur within the TON. Unlike areas in the Tucson Basin, activities within the TON are typically small in scale and have limited impacts.

Because of the lack of significant land-disturbing activities, much of the area within and adjacent to BIA Route 232 is potential pygmy-owl habitat. Relatively few pygmy-owl surveys have been conducted on the TON; however, biologists with the Tohono O'odham Wildlife and Vegetation Management Program or their contractors have conducted pygmy-owl surveys in association with project clearance activities. No general occupancy or research surveys have been conducted. Specifically, the action area was surveyed from 2003 – 2005. No pygmy-owls were detected in 2003, and there were two detections on Route 232 during the 2004 survey. Due to the close proximity of the two detections, they were thought to be the same individual. TON was unable to relocate the individual pygmy-owl(s) during follow-up surveys. Prior to these surveys, a pygmy-owl was confirmed at milepost 0.5 along Route 232 (2000).

Washes provide important pygmy-owl habitat elements. The increased availability of moisture within washes results in enhanced vegetation cover and increased prey availability.

Roads have the potential to affect pygmy-owl movements and dispersal by creating open areas without vegetation cover and through mortality associated with automobile collisions. The likelihood of impacts increases with the increasing width of the cleared right-of-way, the volume of traffic, and the speed of travel along the roadway. The surfacing of BIA Route 232 between SR 86 and San Luis may result in a small increase in the amount of traffic using the road, but this increase is projected to be minor. There is no future development planned for this area.

Currently, proposed critical habitat for the pygmy-owl does not include the TON (USFWS 2002). A draft recovery plan for the pygmy-owl has been developed and received public comment (USFWS 2003). While no recovery areas have been formally designated with the TON, it is likely that the pygmy-owls and pygmy-owl habitat found within the TON will contribute to the recovery of the pygmy-owl. Finalization of both critical habitat and the recovery plan has been put on hold until the legal issues related to the listing of the pygmy-owl have been resolved.

### **Effects of the Proposed Action**

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interdependent or interrelated with the action that will be added to the environmental baseline. Interrelated actions are those that are part of the larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under construction. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

#### Direct Effects

The proposed action could directly affect a pygmy-owl if construction occurs within an occupied pygmy-owl home range. Direct effects include the actual loss of pygmy-owl habitat within an occupied home range. Additional direct effects include the disturbance of nesting or resident pygmy-owls to the extent that it affects their ability to carry out normal behavioral activities such as feeding, breeding, or sheltering. Disturbance could potentially affect pygmy-owl dispersal if project activities are ongoing within an area used by dispersing pygmy-owls.

A pygmy-owl home range is defined as being 280 acres in size. In areas of homogenous habitat, this can be determined by a circle with a radius of 600 meters centered on the nest site or activity center of resident pygmy-owls. It is not known how close either of the one or two pygmy-owls located during surveys may be to the project area. The pygmy-owl detected in 2000 was 800 meters northwest of the road, but we do not know if this is the same individual detected in the 2004 surveys. Until we have further information on the status of the 2004 pygmy-owls, we are assuming that there will be no direct effects to habitat within an occupied home range.

#### Indirect Effects

Implementation of the proposed action will increase the width of unvegetated roadway within the action area. Pygmy-owls are capable flyers, but rarely make flights greater than 40 meters (120 feet) (AGFD 2003). Typical flight patterns are more likely to be from one tree to another nearby tree, avoiding long flights in open areas, presumably to avoid exposure to predation (AGFD 2003). However, increased opening size (i.e., gaps between trees or large shrubs), coupled with increased threats (e.g., moderate to high traffic volumes and other human disturbances), are thought to restrict pygmy-owl movement.

Wide roadways and associated clear zones cause large gaps between tree canopies on either side of roadways and may result in lower flight patterns over roads. This low flight level may result in pygmy-owls flying directly into the pathway of oncoming cars and trucks. Observations of a pygmy-owl flying across wide roadways by consultants to the Tohono O'odham Nation indicate that they can adjust their flight pattern in response to roads – flying high and straight without the characteristic swoop. Roads present a mortality hazard to foraging and dispersing pygmy-owls. Roads can disrupt the tree-to-tree flight pattern of the pygmy-owl; a road's width may discourage a pygmy-owl from crossing, or pygmy-owls that do cross may be struck by passing automobiles. Measures can be implemented in roadway design to minimize these threats and allow successful movement across roadways. Among other measures, decreasing the canopy openings between trees on either side of roads and increasing the density of trees along roadways to provide greater shelter and cover from predators and human activities can be utilized to minimize adverse effects to pygmy-owls attempting to cross roads. Specific research is needed to determine the distance at which road and clear zone widths significantly affect successful pygmy-owl movement, types of vegetation needed, roadway and landscaping designs, speed limits, etc.

Construction of Route 232 would result in the loss of approximately 58 acres of potential pygmy-owl habitat. BIA proposes to reclaim approximately 30 percent (17.4 acres) of the total disturbed area by seeding. This would result in a permanent loss of 40.6 acres of potential pygmy-owl habitat. Over the 9.3 mile length of the project, 139 saguaros are inside the construction zone. Almost all of these saguaros meet the criteria for transplant (less than 25 feet in height, fewer than 6 arms of less than 6-8 feet in length, and not in a decaying state). Only 4 did not meet these criteria. BIA anticipates an 80 percent survival rate; thus 31 of the 139 saguaros will ultimately be affected by the project.

There are three saguaros that will be affected by disturbances in the Quijotoa Material Source Pit. Two meet the criteria for transplanting, thus only one will be affected by expansion of the pit.

Construction will take place outside of the pygmy-owl breeding season, so effects from noise should be temporary in nature and greatly reduced. The revegetation efforts will narrow the corridor that is disturbed to less than 40 feet, and there is documentation of pygmy-owl dispersal crossing paved roads similar to Route 232. It is not anticipated that the road will present a long-term barrier to pygmy-owl dispersal.

Road use is not expected to be increased by the proposed action. Residents of San Luis that currently take Route 30 through Nolia to get to Quijotoa and Casa Grande, rather than taking Route 232 through Sikul Himatk, would now likely take Route 232, especially during inclement weather. BIA anticipates a very minor (perhaps 1-5 cars/day) increase in use. Therefore, effects related to traffic volumes are not anticipated to rise significantly above baseline levels.

### **Interrelated and Interdependent Actions**

We are unaware of any interrelated or interdependent actions associated with the project.

## **Cumulative Effects**

Cumulative effects include the effects of future State, tribal, local, or private non-Federal actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Most of the projects occurring within the TON have a Federal nexus through the Bureau of Indian Affairs, Indian Health Services, or Rural Utilities Service. Non-Federal activities are expected to continue at current low levels and the FWS is unaware of any projects proposed within the action area.

## **Conclusion**

After reviewing the current status of the pygmy-owl, the environmental baseline for the action area, the effects of the proposed roadway and bridge improvements, and cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the pygmy-owl. Critical habitat has been proposed for this species; however, critical habitat has not been proposed within the TON. Therefore, no destruction or adverse modification of critical habitat is anticipated. In making our determination, we considered the following:

- One or two pygmy-owls may be located adjacent to the action area. However, the proposed action includes measures that reduce the likelihood of direct effects to these pygmy-owls. Construction will occur outside the breeding season.
- Salvageable saguaros will be transplanted on-site, thus minimizing the loss of potential pygmy-owl habitat. Disturbed areas will also be reseeded to further minimize effects to the habitat.
- Traffic volumes are not anticipated to increase significantly as a result of the proposed action.

The conclusions of this BO are based on the full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that are incorporated into the project design.

## **INCIDENTAL TAKE STATEMENT**

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act 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 (50 CFR 17.3) 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. "Harass" is defined (50 CFR 17.3) 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 that 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 sections 7(b)(4) and 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 Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

### **Amount or Extent of Take Anticipated**

The FWS does not anticipate the proposed action will incidentally take any pygmy-owls.

### **CONSERVATION RECOMMENDATIONS**

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act 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 pygmy-owl. In furtherance of the purposes of the Act, we recommend that the BIA implement the following discretionary actions:

- Conduct or fund studies using both monitoring and telemetry, to determine pygmy-owl habitat use patterns and relationships between roadways and pygmy-owls. Surveys involving simulated or recorded calls of pygmy-owls require an appropriate permit from us. AGFD should also be contacted in regard to state permitting requirements.
- Cooperate with the TON to develop a conservation plan for the pygmy-owl.
- Assist in the implementation of recovery tasks identified in the pygmy-owl Recovery Plan once the Plan is approved by us.
- Monitor the effectiveness of conservation measures associated with road projects.

### **REINITIATION-CLOSING STATEMENT**

This concludes formal consultation with the BIA on the proposed improvement of BIA Route 232 within the TON, in Pima County, Arizona. 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 maintained (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 that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate the BIA's efforts to identify and minimize effects to listed species from this project. For further information, please contact Mima Falk at 520-670-6150 (x 225) or Sherry Barrett at (x 223). Please refer to consultation number 02-21-05-F-0262, in future correspondence concerning this project.

/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 counties, Arizona: 1997-1998. Arizona Game and Fish Dept. Reg. 5 Wildl. Prog., Phoenix.
- 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 Wildl. Prog. Arizona Game and Fish Dept. Tucson.
- Arizona Game and Fish Department (AGFD). 2002a. Heritage management data system. Nongame Branch, Arizona Game and Fish Department, Phoenix.
- Arizona Game and Fish Department (AGFD). 2002b. Summary of dispersal movements for six juvenile pygmy-owls radio-tracked in southern Arizona, 2000. Arizona Game and Fish Department, Phoenix, Arizona.
- Arizona Game and Fish Department (AGFD). 2003. E-mail communication on September 2, 2003. Draft 2 response to request for information on CFPO unpublished data. Email to Scott Richardson at Scott\_Richardson@fws.gov.
- Arizona Game and Fish Department (AGFD). 2004. E-mail communication on April 2, 2004. Latest Questions on CFPO - 2 April Info Request. E-mail to Scott Richardson at Scott\_Richardson@fws.gov.
- Banks, R.C. 1979. Human-related mortality of birds in the United States. USDI, Fish and Wildl. Serv. Spec. Sci. Rep. Wildl. 215.
- Bendire, C.E. 1892. Life histories of North American birds with special reference to their breeding habits and eggs. U.S. Nat. Mus. Spec. Bull. 1.
- Benson, L. and R.A. Darrow. 1981. Trees and shrubs of the southwestern deserts. The University of Arizona Press. Tucson. 416 pp.
- Boal, C. W. , R. W. Mannan, and K. S. Hudelson. 1998. Trichomoniasis in Cooper's hawks from Arizona. J. Wildl. Diseases 34:590-593.
- Breninger, G.F. 1898. The ferruginous pygmy-owl. Osprey 2(10):128.
- Brown, D.E. 1994. Biotic communities of the southwestern United States and northwestern Mexico. University of Utah Press, Salt Lake City, Utah. 342 pp.

- Bureau of Indian Affairs. 2005. Biological assessment for BIA proposed road construction project PIR 232(1) Tohono O'odham Nation, Pima County, Arizona.
- Burquez, A. and A. Martinez-Yrizar. 1997. Conservation and landscape transformation in Sonora, Mexico. *Journal of the Southwest* 39(3&4):370-398.
- Burquez-Montijo, A., M. E. Miller, and A. Martinez-Yrizar. 2002. Mexican grasslands, thornscrub, and the transformation of the Sonoran Desert by invasive exotic buffelgrass (*Pennisetum ciliare*). In B. Tellman (ed) *Invasive exotic species in the Sonoran region*. The University of Arizona Press and The Arizona-Sonora Desert Museum.
- Cartron, J. L. and D. M. Finch (tech. eds.). 2000. Ecology and conservation of the cactus ferruginous pygmy-owl in Arizona. RMRS-GTR-43. USDA Forest Serv., Rocky Mountain Res. Stat., Ogden, UT.
- Cartron, J.E., S.H. Soleson, S. Russell, G.A. Proudfoot, and W.S. Richardson. 2000a. The ferruginous pygmy-owl in the tropics and at the northern end of its range: habitat relationships and requirements. Pp. 47-53 in J.E. Cartron and D.M. Finch (eds.), *Ecology and conservation of the cactus ferruginous pygmy-owl in Arizona*. RMRS-GTR-43. USDA For. Serv., Rocky Mountain Research Station, Ogden, UT.
- Cartron, J.E., W.S. Richardson, and G.A. Proudfoot. 2000b. The cactus ferruginous pygmy-owl taxonomy, distribution, and Natural History. Pp. 5-15 in J.E. Cartron and D.M. Finch (eds.), *Ecology and conservation of the cactus ferruginous pygmy-owl in Arizona*. Gen. Tech. Rpt. RMRS-GTR-43. USDA, Forest Service, Rocky Mountain Research Station, Ogden, UT.
- Churcher, P.B. and J.H. Lawton. 1987. Predation by domestic cats in an English village. *J. Zool. London* 212:439-455.
- Davis, W.A. and S.M. Russell. 1984. *Birds in southeastern Arizona*. 2nd ed. Tucson Audubon Soc., Tucson, AZ.
- Enriquez-Rocha, P., J.L. Rangel-Salazar, and D.W. Holt. 1993. Presence and distribution of Mexican owls: a review. *Journal of Raptor Research* 27: 154-160.
- 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. 1999. Cactus ferruginous pygmy-owl surveys and nest monitoring on and around the Buenos Aires National Wildlife Refuge, Altar Valley, Arizona. A report to USDI Fish and Wildl. Serv., FWS Coop. Agreement No. 1448-00002-99-G943. 21 pp.
- Flesch, A.D. 2003a. Perch-site selection and spatial use by cactus ferruginous pygmy-owls in south-central Arizona. FWS Coop. Agreement No. 1448-00002-99-G943. *J. Raptor Res.* 37(2):151-157.

- Flesch, A. 2003b. Distribution, abundance, and habitat of cactus ferruginous pygmy-owls in Sonora, Mexico. M.S. Thesis. University of Arizona, Tucson, AZ. 161 pp.
- 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.
- Gilman, M.F. 1909. Some owls along the Gila River in Arizona. *Condor* 11:145-150.
- Gryimek, H.C.B. (ed.). 1972. *Gryimek's animal life encyclopedia*. Van Nostrand Reinhold Co., New York.
- Hanski, I.A. and M.E. Gilpin. 1991. Metapopulation dynamics: brief history and conceptual domain. *In A Metapopulation dynamics: empirical and theoretical investigations@* (M. Gilpin and I. Hanski, eds.), pp. 3-16. Academic Press, London.
- Hanski, I.A. and M.E. Gilpin. 1997. *Metapopulation biology: ecology, genetics and evolution*. Academic Press, San Diego, California. 512 pp.
- Hendricks, D.M. 1985. *Arizona soils*. University of Arizona, Tucson, Arizona.
- Hunter, W.C. 1988. Status of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) in the United States and Northern Mexico. Unpubl. rep., USDI Fish and Wildl. Serv., Phoenix, AZ.
- Hunter, W.C., R.D. Ohmart, and B.W. Anderson. 1987. Status of breeding riparian-obligate birds in southwestern riverine systems. Pp. 10-18 *in* Management and preservation of endangered birds in riparian ecosystems (S. A. Laymon, ed.). *West. Birds* 18:1-96.
- Johnsgard, P.A. 1988. *North American owls*. Smithsonian Inst. Press, Washington D.C.
- 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, Arizona.
- 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* *Owls of the west: their ecology and conservation* (P. Schaffer and S.M. Ehler, eds.). Proceed. Natl. Audubon Soc. Symposium, George Whittel Education Center, Tiburon, CA.
- Johnson, R.R., L.T. Haight, and J.M. Simpson. 1987. Endangered habitats versus endangered species: a management challenge. Pp. 89-96 *in* Management and preservation of endangered birds in riparian ecosystems (S. A. Laymon, ed.). *West. Birds* 18:1-96.

- Johnson, R.R., J.E. Cartron, L.T. Haight, R.B. Duncan, and K.J. Kingsley. 2003. Cactus Ferruginous Pygmy-owl in Arizona, 1872-1971. *The Southwestern Naturalist*. 48(3):389-401
- Karalus, K.E. and E.W. Eckert. 1974. *The owls of North America: north of Mexico*. Doubleday and Co., Inc., Garden City, New York. 278 pp.
- Klem, D.A. 1979. *Biology of collisions between birds and windows*. Ph.D. diss. Southern Illinois Univ.
- McLaughlin, S.P. and J.E. Bowers. 1982. Effects of wildfire on the Sonoran desert plant community. *Ecology* 61:246-24.
- Millsap, B.A. and R.R. Johnson. 1988. Ferruginous pygmy-owl. Pages 137-139 in Glinski, Richard L.; Pendleton, Beth Giron; Moss, Mary Beth; [and others], eds. *Proceedings of the southwest raptor management symposium and workshop; 1986 May 21-24; Tucson, AZ*. NWF Scientific and Technical Series No. 11. Washington, DC: National Wildlife Federation. 395 pp.
- Monson, G. and A.R. Phillips. 1981. *Annotated checklist of the birds of Arizona*. The University of Arizona Press, Tucson, Arizona. 240 pp.
- Monson, G. 1998. Ferruginous pygmy-owl. Pp. 159-161 in *The raptors of Arizona* (R. L. Glinski, ed.). Univ. of Arizona Press, Tucson.
- Oberholser, H.C. 1974. *The bird life of Texas* (E.B. Kincaid, Jr., ed.). Vol. I. Univ. of Texas Press, Austin.
- Olin, G. 1994. *House in the sun. A natural history of the Sonoran Desert*. Southwest Parks and Monuments Assoc. Tucson, AZ. 210 pp.
- Phillips, A.R., J. Marshall, and G. Monson. 1964. *The birds of Arizona*. University of Arizona Press, Tucson, Arizona. 212 pp.
- Proudfoot, G.A. 1996. *Natural history of the cactus ferruginous pygmy-owl*. Master's Thesis, Texas A & M University, Kingsville.
- Proudfoot, G.A. 2004. E-mail communication on June 29, 2004. E-mail to Scott Richardson at [Scott\\_Richardson@fws.gov](mailto:Scott_Richardson@fws.gov).
- Proudfoot, G.A. and R.R. Johnson. 2000. Ferruginous Pygmy-Owl (*Glaucidium brasilianum*). In *The Birds of North America*, no. 498 (A. Poole and F. Gill, eds.). Birds of North America, Inc., Philadelphia, PA.

- Proudfoot, G.A. and A.A. Radomski. 1997. Absence of hematozoa from ferruginous pygmy-owls (*Glaucidium brasilianum*) in southern Texas. J. Helminthol. Soc. Wash. 64:154-156.
- 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.
- Russell, S.M. and G. Monson. 1998. The birds of Sonora. Univ. of Arizona Press, Tucson.
- Swarth, H.S. 1914. A distributional list of the birds of Arizona. Cooper Ornithological Club, Hollywood, California.
- 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.
- Tibbitts, T. 1996. Organ Pipe Cactus National Monument: Ferruginous pygmy-owl observations. Compiled by the Organ Pipe Cactus National Monument Natural Resources Management Department. Organ Pipe Cactus National Monument, Arizona. 11 pp.
- University of Arizona. 1995. Records from the University of Arizona Bird Collection. Provided by T. Huels.
- 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. Federal Register. 62:10730-10747.
- 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*). Federal Register 64:37419-37440.
- 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*). Federal Register. 67:71032-71064
- U.S. Fish and Wildlife Service. 2003. Draft cactus ferruginous pygmy-owl recovery plan. Albuquerque, New Mexico. 162 pp. + appendices.
- Wilcox, R.L., W.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. Rep. to Arizona Game and Fish Dept., Phoenix. 30pp.

Wilcox, R.L., W.S. Richardson, D. Abbate. 2000. Habitat selection by cactus ferruginous pygmy owls in southern Arizona B preliminary results. Region V Wldlf. Prog. Rep. Arizona Game and Fish Dept., Tucson.

## Appendix A

In your January 7, 2005 request for formal consultation, you concluded that the proposed construction of BIA Route 232 was not likely to adversely affect the lesser long-nosed bat. We concur with this finding based on the following reasons:

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*)

- There are no known roost sites in the Quijotoa Mountains; the nearest roost site on TON is the Mammon mine, located approximately 30 miles north of the project area. Bats may fly that distance to forage, but there are many areas nearer to the roost providing similar resources that they can utilize.
- There are no agave plants (the preferred food resource) within the project area. Saguaros will be affected by the proposed action. The small number of saguaros (31) that could be permanently removed from the project area is insignificant compared to the number of saguaros that exist outside of the project area. It is not anticipated that the loss of these saguaros represent a significant loss of a food resource for the bats.