

**United States Department of the Interior  
U.S. Fish and Wildlife Service  
2321 West Royal Palm Road, Suite 103  
Phoenix, Arizona 85021  
Telephone: (602) 242-0210 FAX: (602) 242-2513**

AESO/SE  
02-21-02-F-0544

July 9, 2003

Ms. Cindy Lester, P.E.  
United States Army Corps of Engineers  
Arizona-Nevada Area Office  
3636 North Central Avenue, Suite 900  
Phoenix, Arizona 85012-1939

Subject: Biological Opinion on the Effects of the Development of Section 36 in Township 11 South,  
Range 12 East in Marana, Arizona

Dear Ms. Lester:

This document constitutes the U.S. Fish and Wildlife Service's (FWS) biological and conference opinions based on our review pursuant to section 7 of the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) of the proposed development of Section 36 in Township 11 South, Range 12 East, in Pima County, Arizona. This consultation considers the effects of the proposed action on the endangered cactus ferruginous pygmy-owl (pygmy-owl, or owl) (*Glaucidium brasilianum cactorum*), its proposed critical habitat, and the endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*).

At the time of the initiation of this consultation, the proposed action involved authorization under the National Pollutant Discharge Elimination System (NPDES) general permit, pursuant to section 402 of the Clean Water Act (CWA) from the EPA and a nationwide permit pursuant to section 404 of the CWA from the Army Corps of Engineers (COE). The EPA was originally designated as the lead Federal agency for this consultation. Subsequent to the initiation of this consultation, the EPA delegated its NPDES program to the Arizona Department of Environmental Quality. By letter dated January 22, 2003, the role of lead agency was transferred from the EPA to the COE. The COE permit authorization will facilitate development within an approximately 598-acre residential and commercial development, with open space, located in Marana, Pima County, Arizona (Project).

Also subsequent to the initiation of this consultation, FWS proposed to designate critical habitat for the pygmy-owl. You and the project proponent have requested that this consultation also include a conference pursuant to ESA section 7(a)(4) on potential impacts to proposed critical habitat for the pygmy-owl.

You also requested our concurrence that the proposed action is not likely to adversely affect the lesser long-nosed bat. We concur with this determination for the lesser long-nosed bat. The basis for our concurrence is provided in Appendix A of this document.

This biological and conference opinion (collectively BO) will address the potential impacts of this project on the pygmy-owl and its proposed critical habitat and is based on information provided in the May, 2002 Section 36 Biological Assessment (WestLand Resources 2002a); the November, 2002 revised Section 36 Biological Assessment (Westland Resources 2002b), Section 36 Supplemental Data for Biological Assessment (Westland Resources 2003) (collectively BA); various correspondence and meetings among the project proponent, their consultant, the Arizona Game and Fish Department (AGFD), and us; several telephone conversations; correspondence from AGFD; and other sources of information. A complete administrative record of this consultation is on file at this office. We have assigned log number 2-21-03-F-0544 to this project. Please refer to that number in future correspondence on this consultation.

### **Consultation History**

January 31, 2002 - Transmittal of initial site plan from project proponent to FWS

April 25, 2002 - Meeting among the project proponent, their consultant, AGFD, and FWS to discuss development concepts and issues

May 20, 2002 - BA received from Westland Resources

May 23, 2002 - Formal consultation initiated

June 18, 2002 - Meeting among the project proponent, their consultant, AGFD and FWS to discuss comments on BA and revised site plan

June 20, 2002 - Comments received from AGFD regarding BA

September 10, 2002 - Memo from Westland Resources regarding new AGFD data on disturbance within owl home ranges

October 24, 2002 - Meeting among the project proponent, their consultant, their legal counsel, and FWS to discuss the most recent site plan and development concepts

November 13, 2002 - Revised BA received from Westland Resources

November 29, 2002 - FWS request for more information and clarification sent to the project proponent and their consultant

November 29, 2002 - Additional information and clarification received from project proponent

December 16, 2002 - Additional information and clarification received from project proponent

December 26, 2002 - Draft Biological Opinion submitted to EPA and project proponent

January 22, 2003 - EPA transfer of lead agency role to COE

January 30, 2003 - Supplemental Data from Westland Resources

February 27, 2003 - Comments on Draft Biological Opinion received from project proponent

April 29, 2003 - Draft Final Biological Opinion sent to project proponent

June 5, 2003 - Comments received from project proponent on Draft Final Biological Opinion

## **I. DESCRIPTION OF THE PROPOSED ACTION**

### **Proposed action**

The proposed action is the authorization under and the project proponent's utilization of a section 404 nationwide permit from the COE. The authorization under this permit will facilitate the development of a mixed-use residential community located in Section 36 of Township 11 South, Range 12 East in Marana, Pima County, Arizona. Development is proposed for approximately 172 acres of the 598 acres included in the project. The remainder of the project site (approximately 425 acres) will remain as undisturbed open space. The entire project falls within Unit 3 of proposed critical habitat for the pygmy-owl (U.S. Fish and Wildlife Service 2002).

The Project Plan divides the Property into areas to be utilized for Open Space and Development with Significant Habitat Modification, and identifies the approximate acreage for each use. The following discussion portrays the project description as provided by the project proponents.

Development with Significant Habitat Modification - The Project Plan (as set forth on Figure 3 of the BA) identifies 172.23 acres as Development With Significant Habitat Modification including 108.2 acres for development of not more than 480 residential units and 64 acres for commercial development (divided into two separate parcels). Discussions with the project proponent indicate that the commercial areas may include multi-family dwellings (apartments) and that such development would likely be restricted to one of the two commercial parcels. The boundaries of the Development With Significant Habitat Modification shall not be modified without the consent of FWS unless the amount of Open Space is not decreased, and the boundary

is moved by less than 100 feet and in such a manner that the configuration of the Open Space remains conducive to pygmy-owl movement and nesting. In no event shall the total area of Development With Significant Habitat Modification be greater than 172.23 acres.

All development on the Project site shall be done in conformance with the conservation program approved by the Town of Marana, and revegetation will use only approved species. Any modifications to this existing conservation program must be approved by FWS. Additionally, where commercial development abuts Open Space without trees, native trees will be placed along the perimeter of development that is adjacent to Open Space. Habitat connections will be maintained as depicted on the Project Plan to facilitate movement of owls throughout the Open Space.

Open Space - The project proponent shall establish and record a conservation easement, to be held by and administered by a non-profit homeowners association (HOA), upon all Open Space and shall adopt and record protective covenants (CC&Rs) that require the Open Space easement to be managed in accordance with the following requirements. Such requirements within the CC&Rs shall not be amended without the express consent of FWS. The CC&Rs shall require a levy of assessments by the HOA to fund compliance with these requirements. The CC&Rs shall provide that, commencing upon occupancy of homes, the HOA shall promptly and continuously maintain and manage the Open Space easement by taking the measures described below:

1. The Open Space will be maintained in a natural condition, except as expressly set forth herein.
2. Prior to occupancy of a residential lot, property lines abutting Open Space shall be fenced. Fence materials shall not include woven wire or chain link. The Open Space will be surveyed by a plant ecologist at least once every three years, and a permitted biologist shall conduct a pygmy-owl research-type survey once each year (3 visits/year).
3. Native plants will be salvaged and replanted from any authorized disturbances (as described below) that occur within the Open Space.
4. Reasonable measures will be utilized to control any invasive exotic species.
5. No development or other activities will be permitted in the Open Space except for pedestrian trails, developed in a manner that will avoid and minimize the disturbance and removal of vegetation, and minor utility crossings (these will be revegetated).
6. The following activities are prohibited within the Open Space: a) use of firearms, b) any off-road vehicle use, c) use of pesticides or herbicides for purposes other than controlling invasion of exotic species, and d) racing events or other publicized events that attract large crowds.

7. The lot owners will be required to contain all domestic animals within the enclosed area on their lot or under strict control at all times. Pets that are outside of enclosed areas shall be leashed in conformance with Pima County Code 6.04.030.
8. The project proponent or HOA will prepare annual reports and provide them to FWS with results of required surveys and identification of the compliance with the foregoing requirements.

The Town of Marana is currently undertaking the development of a Habitat Conservation Plan (HCP) as part of the process for obtaining a Section 10 permit for the pygmy-owl and other species. It may be beneficial on a regional scale to have the open space associated with this project included as part of the HCP process. As proposed by the project developers, the preservation covenants associated with the HOA will authorize assignment of the conservation easement and open space maintenance responsibilities to the Town of Marana upon written request by the Town of Marana.

Specific conservation measures have been identified in the BA and in other discussions with the project proponent. Conservation measures are part of the proposed action, and their implementation is required under the terms of this consultation. Conservation measures related to this project include:

- Town of Marana Conservation Program

Measures identified in the Conservation Program approved by the Town of Marana will provide a framework to minimize impacts of the development on native plants, wildlife, and other natural resources.

- Conservation through preservation of suitable pygmy-owl habitat

As described above, approximately 425 acres of suitable pygmy-owl habitat will be protected as open space within this project. Open space areas will be conserved in a natural condition through the recording of a conservation easement to be held by the HOA or the Town of Marana subject to protective covenants as outlined above. Through its articles of incorporation and CC&R's, the HOA will establish its authority and responsibility for ensuring that protected open space remains undisturbed. The conservation easement shall be recorded to the benefit of the HOA prior to the initiation of construction. Approved uses within the open space are of a passive, non-destructive nature. Off-road vehicles, firearms, pesticides and herbicides, and uses resulting in large groups are prohibited. Utility crossings within the Open Space that require vegetation removal will be revegetated. Changes to protected open space may occur that would decrease the area that can be developed in some portions of the project, but would have a corresponding increase elsewhere in the Project. Such changes would be based on development constraints and conservation measures outlined within this biological and conference opinion. The overall total of developed area would be maintained by the following: shifting additional development area to the northwest corner of the project or by moving boundaries on the Project Plan by no more than one hundred feet (provided viable habitat connectivity is maintained) or in a manner approved by FWS.

- Preservation of habitat connectivity to promote pygmy-owl movements within and adjacent to the project

Undisturbed, connected areas of vegetation will be preserved in a configuration which allows owls to move between protected wash corridors through and around planned residential and commercial development. Specifically, 12 linkages through the residential areas ranging from 75 to 150 feet wide have been planned. Additionally, open space between the two commercial parcels and the residential development has been identified. Preservation of a minimum of 300 feet of open space will occur in the area north of Commercial Parcel A. The minimum width between Commercial Parcel B and the residential development to the north is 200 feet and ranges from 200 feet to approximately 700 feet in width. In addition, where Commercial Parcels A and B abut the Protected Open Space in areas lacking trees, native trees shall be planted along the perimeter of those parcels to provide a buffer from lights, noise, and other human activities, as well as to provide enhanced connectivity.

- Development Constraints

Total vegetation disturbance within the 598-acre project site will be limited to 172.23 acres. In addition, provisions have been included to protect pygmy-owls which may be located within or adjacent to the project boundaries prior to and during the construction phase of this project. As used herein, the term “pygmy-owl territory” shall refer to either: (i) all area within 600 meters of an active, occupied pygmy-owl nest site (Nest Site), or (ii) all area within 600 meters from the centroid of observations of a pygmy-owl determined, on the basis of accepted biological monitoring procedures, to have established and be defending a territory at that location. For purposes of this paragraph, the term “Territory Center” shall mean the Nest Site (if existing), or the centroid of the observations described in the immediately preceding sentence, as applicable. The Project Proponent shall conduct surveys in accordance with the approved FWS pygmy-owl survey protocol for each phase of construction activity within the Project Plan (Construction Phase) prior to commencement of clearing, and if a pygmy-owl is detected at that time within 600 meters of a proposed Construction Phase (by such survey or by confirmed AGFD telemetry), then the project proponent and FWS will immediately consult and jointly determine whether a pygmy-owl Territory exists. If a Territory Center is located within 400 meters of a proposed Construction Phase of the Project, then within such Construction Phase the project proponent will implement the following measures:

- 1) There shall be no construction activities which have the direct and immediate effect of causing physical harm to a pygmy-owl,
- 2) there shall be no removal of a nest site,
- 3) development activity will be restricted, as reasonably determined by FWS, within 100 meters of the Territory Center on a year-round basis,
- 4) scheduled land clearing activities within 400 meters of the Territory Center will occur outside of the time period from February 1<sup>st</sup> through July 31<sup>st</sup> (the Breeding Season),

- 5) the area to be cleared or graded (Development Area) in the Construction Phase shall be modified so that no more than 25 percent of the Property within 600 meters of the Territory Center is cleared,
  - 6) the project proponent shall employ an onsite monitor to ensure compliance with the requirements of the BA and BO,
  - 7) the project proponent shall provide educational information to construction crews working during the construction phase to inform crews of the BO requirements and to encourage minimization of disturbance to pygmy-owls and habitat,
  - 8) the project proponent will employ dust abatement procedures at or exceeding industry and local regulatory standards,
  - 9) the project proponent shall avoid clustering the development in a manner that significantly restricts pygmy-owl movement from the Territory Center to other suitable habitat areas,
  - 10) the project proponent shall keep the FWS informed of the status of activities and compliance with these requirements and seek technical assistance from the FWS in implementing these conservation measures in a manner that is most effective in minimizing impacts to pygmy-owls, and
  - 11) In unoccupied areas more than 600 meters from a nest or activity center, and in areas where there is a pygmy-owl response, but no territory identified, development may proceed without restriction. If subsequent survey efforts in accordance with our approved protocol fail to locate a previously detected pygmy-owl, the project proponent and FWS shall mutually determine whether the pygmy-owl territory has been abandoned, in which event any restrictions related to that area shall cease.
- Public Education

In the event that a pygmy-owl territory is identified within the project site, the project proponent shall conduct public education and awareness programs focusing on measures to reduce or eliminate free roaming domestic pets, window strikes, and toxins (pesticides, herbicides, etc.) within the general area.

## **II. 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 ([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 Texas information need to be qualified.

### 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 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.

### Listing and Critical Habitat

The Arizona population of the pygmy-owl was listed as an endangered distinct population segment on March 10, 1997 (62 FR 10730) without critical habitat. In response to a court order, approximately 731,712 acres of critical habitat were designated on July 12, 1999 (64 FR 37419) 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 (67 FR 71032). The proposal includes approximately 1,208,000 acres in portions of Pima and Pinal counties, Arizona. Based on the Court order, we must issue a final rule by November 2003. The plaintiff’s appeal of the listing decision is still pending.

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 maintain the viability of groups of owls that are dependant upon continued genetic interchange. Two premises were considered in establishing this system: protecting verified owl sites, the presence of one or more of the constituent elements, and the mean straight-line dispersal distance (8 km (5 mi)) from nest sites; and providing for the linkage of these verified sites and three of the four recovery team-recommended Special Management Areas (SMAs) for which we have adequate scientific information indicating that they are essential to the conservation of the listed population and threatened by habitat loss.

In order to connect these sites with each other and with the SMAs, we buffered each verified pygmy-owl site with the mean dispersal distance documented for dispersing juvenile pygmy-owls in Arizona (8 km (5 mi)). We connected these buffer areas to each other and the SMAs with other lands also containing the primary constituent elements. The primary constituent elements determined necessary for survival and recovery of the pygmy-owl include: 1) elevations below 1,200 m (4,000ft) within the biotic communities of Sonoran riparian deciduous woodlands; Sonoran riparian scrubland; mesquite bosques; xeroriparian communities; tree-lined drainages in semidesert, Sonoran savanna, and mesquite grasslands; and the Arizona Upland and Lower Colorado River subdivisions of Sonoran desertscrub (see Brown 1994 for a description of vegetation communities); 2) nesting cavities located in trees including, but not limited to cottonwood, willow, ash, mesquite, palo verde, ironwood, and hackberry with a trunk diameter of 15 cm (6 in) or greater measured 1.4 m (4.5 ft) from the ground, or large columnar cactus such as saguaro or organ pipe greater than 2.4 m. (8 ft.); 3) multilayered vegetation (presence of canopy, mid-story, and ground cover) provided by trees and cacti in association with shrubs such as acacia, prickly pear, desert hackberry, graythorn, etc. and ground cover such as triangle-leaf bursage, burro weed, grasses, or annual plants; 4) vegetation providing mid-story and canopy level cover (this is provided primarily by trees greater than 2 m (6 ft) in height) in a configuration and density compatible with pygmy-owl flight and dispersal behaviors; and 5) habitat elements configured and human activity levels minimized so that unimpeded 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 on an annual basis).

The proposed critical habitat is divided into five separate critical habitat units (CHUs) encompassing all of the verified recent sites (since 1997) occupied by pygmy-owls in Arizona, with the exception of pygmy-owls located on the Tohono O'odham Nation. Each of the proposed units serve varying functions necessary for the recovery of the pygmy-owl, including areas of significant breeding activity, the maintenance and expansion of groups of owls, facilitating the movement of juvenile pygmy-owls to establish breeding sites, as well as movements among currently known groups of pygmy-owls essential for gene flow. When consulting with Federal agencies on projects that may destroy or adversely modify critical habitat, we will evaluate the effects of their project on both the Unit and the-whole-of critical habitat. Then we can best evaluate the scope of effects and recommend project modifications that conserve or augment the values that would otherwise potentially be lost to that particular unit.

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. Following consideration of the public comments, 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 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 are found within Arizona throughout the year and do not appear to 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. 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 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). 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, Arizona Game and Fish Department (AGFD) unpubl. data). One nest in an ash tree and one 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 unpubl. data). Apparently, unpaired females may also remain in the same territory for some period of time. In the spring of 2001, an unpaired female (the male died in 2000) remained in the same territory as was occupied in previous years well into the spring, exhibiting territorial behavior (calling) for approximately two months until ultimately switching territories, pairing with an unpaired male and successfully nesting (AGFD unpublished data). Researchers suspect that if this unpaired female could have attracted an unpaired male during that time, she would have likely remained in her original territory. Apparently at some point the urge to pair is too strong to remain, and females seek out new mates. 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 owl sites, as well as new sites established by dispersing pygmy-owls. 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. Most of the telemetry data gathered occurs during the breeding season due to the opportunity to capture the owls 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 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.

The productivity of pygmy-owls in Arizona has been documented by monitoring nest sites and determining the number of young which fledge. Occasionally, clutch sizes and the number of nestlings have been determined through the use of telescoping camera equipment. Table 1 presents a summary of documented pygmy-owl production in Arizona from 1999 through 2001.

Table 1. Productivity and Persistence of Pygmy-Owl Nesting Territories in Southern Arizona, 1999 - 2001\*

	<b>Northwest Tucson (n=10)</b>	<b>Organ Pipe Cactus National Monument (n=5)</b>	<b>Pinal County (n=3)</b>	<b>Altar Valley (n=12)</b>
Nests/Year	3.3 (Range 3-4)	1.6 (Range 1-3)	1.0 (Range 0-2)	4.0 (Range 1-6)
Young/Year	12.6 (Range 11-16)	2.5 (Range 0-5)	3.3 (Range 0-5)	9.0 (Range 4-12)
Young/Nest	3.8 (Range 3.6-4)	1.3 (Range 0-1.6)	3.3 (Range 0-5)	2.5 (Range 2-4)
Nest Activity**	0.42	0.33	0.50	0.44

\* AGFD unpublished, preliminary data

\*\* Mean percent of years each nest site was active

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 unpubl. data). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999). Arizona Game and Fish Department (AGFD) telemetry monitoring in 2002 indicated at least three of the nine young were killed by predators prior to dispersal during a year when tree species failed to leaf out due to drought conditions (AGFD unpubl. data). Therefore, cover near nest sites may be important for young to fledge successfully (Wilcox *et al.* 1999, Wilcox *et al.* 2000). A number of fledgling pygmy-owls have perished after being impaled on cholla cactus, probably due to undeveloped flight skills (Abbate *et al.* 1999). In order to support successful reproduction and rearing of young, home ranges should provide trees and cacti that are of adequate size to provide cavities in proximity to foraging, roosting, sheltering and dispersal habitats, in addition

to adequate cover for protection from climatic elements and predators and occur in an appropriate configuration in relation to the nest site.

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). Observations in Arizona from 1996 through 1998 indicate that reptiles, birds, mammals, and insects were 44, 23, 6, and 3 percent, respectively, of pygmy-owl prey deliveries recorded; 24 percent were unidentified (Abbate *et al.* 1999). It is likely that use of insects was underestimated in these observations because of the speed at which they are consumed and the difficulty in observing such small prey items. 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). 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.

Free-standing 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 unpubl. data). 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

Historically, pygmy-owls were recorded in association with riparian woodlands in central and southern Arizona (Bendire 1892, Gilman 1909, Johnson *et al.* 1987). 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*, and *P. glandulosa*) 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). This subdivision is limited in its distribution, forming a narrow, curved band along the northeast edge of the Sonoran Desert from the Buckskin Mountains, southeast to Phoenix, Arizona, and south to Altar, Sonora, Mexico. 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 (*Cercidium floridum*), foothills paloverde (*C. microphyllum*), ironwood (*Olneya tesota*), mesquites (*Prosopis* spp.), and cat-claw acacia (*Acacia* spp.). Cacti of many species are found within this subdivision, and include many varieties of cholla and prickly pear (*Opuntia* spp.), fish-hook barrel cactus (*Ferocactus wislizenii*), and compass barrel cactus (*F. acanthodes*) (Brown 1994). The paloverde-cacti-mixed scrub series is described as developed on the bajadas and mountain sides away from valley floors. A bajada is the area between level plains and the foot of a mountain and is dissected by arroyos, exhibiting numerous variations in slope and pattern. While there is great variation between bajadas, they are generally characterized by good drainage and slowed evaporation, resulting in enhanced growing conditions for xerophytic plants. Cacti are particularly prevalent on bajadas, and woody, spiny shrubs and small trees, and annuals are abundant. The increased diversity of plants in turn supports a diversity of wildlife species (Benson and Darrow 1981, Olin 1994). 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, all of the areas within this vegetation community are not vegetatively equal. Preliminary habitat assessment data appears 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). These types of 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.

However, over the past several years, pygmy-owls have also been found in riparian and xeroriparian communities and semidesert grasslands as classified by Brown (1994). Desertscrub communities are characterized by an abundance of saguaros or large trees, and a diversity of plant species and vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. Semidesert grasslands have experienced the invasion of velvet mesquites (*Prosopis velutina*) in uplands and linear woodlands of various tree species along bottoms and washes.

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 (*Carnegiea giganteus*), or organ pipe cactus (*Stenocereus thurberi*) 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).

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.* 2000). This is related to the fact that canopy cover and layers of vegetation provide hunting perches, thermal cover, and promote predator avoidance regardless of species. Larger trees with greater canopy also have a greater potential to support cavities needed for nesting. Flesch (1999) indicated that areas with large trees and canopy coverage are likely important areas for pygmy-owls in the Altar Valley. 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

The pygmy-owl is one of four subspecies of the ferruginous pygmy-owl. It occurs 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. Only the Arizona population of the pygmy-owl is listed as an endangered species (U.S. Fish and Wildlife Service 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 (AGFD unpubl. data, Hunter 1988).

Records from the eastern portion of the pygmy-owl's range include a 1876 record from Camp Goodwin (nearby current day Geronimo) on the Gila River, and a 1978 record from Gillard Hot

Springs, also on the Gila River. Pygmy-owls have been found as far west as the Cabeza Prieta Tanks, Yuma County in 1955 (Monson 1998). Hunter (1988) found fewer than 20 verified records of pygmy-owls in Arizona for the period of 1971 to 1988.

Documentation of the total number of pygmy-owls and their current distribution in Arizona is incomplete. Survey and monitoring work in Arizona resulted in documenting 41 adult pygmy-owls in 1999, 34 in 2000, 36 in 2001, and, most recently, 24 in 2002. A cumulative total of 85 occupied sites (includes both single or paired birds) were recorded during these 4 years (Abbate *et al.* 1999, 2000, AGFD unpubl. data). Most of these pygmy-owls were 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 systematic surveys have not been conducted in all areas of potential habitat. Table 2 summarizes the numbers of pygmy-owls documented since 1993.

Table 2. Numbers and distribution of documented pygmy-owl locations 1993 - 2002 (Abbate *et al.* 1996, 1999, 2000, AGFD unpubl. data)

Area	Year	# of Sites	# of Adults	# of Young
<b>Northwest Tucson</b>	1993-1997	9	19	6
	1998	4	7	11
	1999	6	10	16
	2000	8	11	11
	2001	5	8	10
	2002	9	9	2
	Total (% of all areas)		19 (33 %)	65 (38 %)
<b>Pinal County</b>	1993-1997	2	6	1
	1998	2	2	0
	1999	3	5	5
	2000	2	3	5
	2001	0	0	0
	2002	1	1	0
Total (% of all areas)		6 (11 %)	17 (10 %)	11 (10 %)
<b>Altar Valley</b>	1998	2	4	unknown

	1999	14	18	11
	2000	6	8	4
	2001	11	18	12
	2002	8	10	7
Total (% of all areas)		21 (37 %)	58 (34 %)	34 (31 %)
<b>OPCNM/Cabeza Prieta</b>	1993-1997	2	2	0
	1998	1	2	4
	1999	3	4	unknown
	2000	6	8	0
	2001	7	10	5
	2002	3	4	0
Total (% of all areas)		11 (19 %)	30 (18 %)	9 (8 %)

In addition, recent survey 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. The extent to which pygmy-owls disperse across the U.S./Mexico border is unknown, but recent survey work indicates that owls regularly occur along the border (Flesch and Steidl 2002, 2000). 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.

The patchy, dispersed nature of the pygmy-owl population in Arizona 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. One 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 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 typically fly from tree to tree instead of long flights and 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. 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 which sometimes continue into the subsequent breeding season (AGFD unpubl. data).

### Reasons For Listing

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. A species can be listed if at least one of these five factors applies to the extent that the species is in danger of extinction throughout all or a significant portion of its range (endangered as defined in section 3(6) of the ESA), or likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (threatened as defined in section 3(19) of the ESA). We determined that the following three factors applied to the pygmy-owl - Arizona DPS to the extent that endangered status is appropriate (USFWS 1997).

*Factor 1 - 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 (U.S. Fish and Wildlife Service 1997, Abbate *et al.* 1999). The complete removal of vegetation and natural features required for many large-scale and high-density developments directly and indirectly impacts the pygmy-owl (Abbate *et al.* 1999).

Pygmy-owls are capable flyers, but rarely make flights greater than 100 ft. (observational data from AGFD and FWS). 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 (G. Proudfoot, unpubl. data, AGFD, unpubl. data). However, as opening size (i.e., gaps between trees or large shrubs) increases, coupled with increased threats (e.g., moderate to high traffic volumes and other human disturbances) relatively wide open areas may restrict pygmy-owl movement. Wide roadways and associated clear zones cause large gaps between tree canopies on either side of roadways, resulting in lower flight patterns over roads. This low flight level may result in owls flying directly into the pathway of oncoming cars and trucks, significantly increasing the threat of owls being struck. 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 owls attempting to cross roads. Specific research is needed to determine the distance at which road and clear zone widths significantly affect successful owl movement, types of vegetation needed, roadway and landscaping designs, speed limits, etc.

Researchers in Arizona have found that pygmy-owls require habitat linkages, within and among home ranges, for movement and dispersal of young. Continuous cover or patches of trees and large shrubs spaced at close, regular intervals, to provide concealment and protection from predators and mobbing, as well as to provide shade and cool temperatures, is necessary (AGFD unpubl data, Abbate *et al.* 1999). Pygmy-owls, particularly juveniles because of their inexperience, are susceptible to predation, weather extremes, human-related injury/mortality factors (e.g., cars, buildings, fences, domestic cats, etc.) and other mortality factors (mortality of juveniles is typically 50% or more for owls and other raptors). Therefore, it is important to maintain habitat conditions that reduce their exposure to these threats and provide protection as they disperse from their natal areas. A high degree of cover throughout the landscape increases the likelihood of survivorship to the next breeding season. Limiting these mortality factors is important, especially for small, depressed populations, such as pygmy-owls in Arizona.

#### *Factor 4 - Inadequacy of existing regulatory mechanisms.*

Although the pygmy-owl in Arizona is considered nonmigratory, 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 including 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 5 - Other natural or manmade factors affecting its continued existence.*

We identified other factors that may affect the pygmy-owl, including: low levels of genetic variation, possible contamination from pesticides, and potential competition from other bird species that use cavities for nesting (e.g., European starlings [*Sturnus vulgaris*]).

Recent genetic research suggests that pygmy-owls in the action area may be isolated from other populations in Arizona and Mexico (Proudfoot and Slack 2001). They have found that the low level of genetic variation and the absence of shared haplotypes between owls in northwestern Tucson and the remainder of the State and Mexico may be indicative of natural divergence of this population from the rest of the pygmy-owl population in Arizona. Specifically, this study found that pygmy-owls in northwestern Tucson are in a distinct clade and suggests a current separation between populations in northwestern Tucson and elsewhere in the State and Mexico. In addition, these owls have extremely low levels of average haplotype diversity. Researchers acknowledge this may also be a product of sampling (i.e., sampling from one maternal lineage) and/or an extremely high level of inbreeding as a result of low population numbers and geographic isolation. Given the low number of pygmy-owls in the action area, their potential isolation from source populations, the fact that inbreeding has occurred to the second generation in two documented cases, and potential pressure from urban development, there is a high level of concern for the Tucson Basin population of pygmy-owls.

Application of pesticides and herbicides in Arizona occurs year-round, and these chemicals may pose a threat to the pygmy-owl. The presence of pygmy-owls in proximity to residences, golf courses, agricultural fields, and nurseries may cause direct exposure to pesticides and herbicides. Furthermore, ingestion of affected prey items may cause death or reproductive failure (Abbate *et al.* 1999). Illegal dumping of waste also occurs in areas occupied by pygmy-owls and may be a threat to pygmy-owls and their prey; in one case, drums of toxic solvents were found within one mile of a pygmy-owl detection (Abbate *et al.* 1999).

#### Additional Threats

Although not used as the basis of listing, we identified several other potential threats to the pygmy-owl in the final listing rule (USFWS 1997).

*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. In the United States, pygmy-owls

are rare and highly sought by bird watchers, who concentrate at a few of the remaining known locations. Limited, conservative bird watching is probably not harmful; however, excessive attention and playing of tape-recorded calls may at times constitute harassment and affect the occurrence and behavior of the pygmy-owl (Oberholser 1974, Tewes 1995). For example, in 1996, a resident in Tucson reported a pygmy-owl sighting which subsequently was added to a local birding hotline, and the location was added to their website on the internet. Several car loads of birders were later observed in the area of the reported location (AGFD pers. comm. 1999). As recently as 2003, concerns have been expressed by property owners that birders and others have been documented trying to get photos or see pygmy-owls at occupied sites.

One of the few areas in Texas known to support pygmy-owls continues to be widely publicized as having organized field trips and birding festivals (American Birding Association 1993, Tropical Birds of the Border 1999). Resident pygmy-owls are found at this highly visited area only early in the breeding season, while later in the season they can not be detected. O'Neil (1990) also indicated that five birds initially detected in southern Texas failed to respond after repeated visits by birding tours. It is unknown if the birds habituate to the playing of taped calls and stopped responding, or if they abandoned the area. Oberholser (1974) and Hunter (1988) additionally indicated that in southern Texas, recreational birdwatching may disturb owls at highly visited areas.

*Predation and Disease.* 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. In Texas, eggs and nestlings were depredated by racoons (*Procyon lotor*) and bullsnakes (*Pituophis catenifer*). Both adult and juvenile pygmy-owls are likely killed by great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), and eastern screech-owls (*Otus asio*) (Proudfoot and Johnson 2000, G. Proudfoot unpubl. data). Similar predators are suspected in Arizona. Pygmy-owls are particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999). Therefore, cover near nest sites may be important for young to fledge successfully (Wilcox *et al.* 1999, Wilcox *et al.* 2000). Although nest depredation has not been recorded in Arizona, only a relatively small sample of nests have been monitored (n = 37 from 1995-2001). However, recent research indicates that predation likely plays a key role in pygmy-owl population dynamics, particularly after fledging and during the post-breeding season (AGFD unpubl. data) Additional research is needed to determine the effects of predation, including nest depredation, on pygmy-owls in Arizona and elsewhere.

Hematozoa (blood parasites) may cause neonatal bacterial diarrhea, marginal anemia, and septicemia (Hunter *et al.* 1987), reducing survival and recruitment of birds. However, no evidence of hematozoa in pygmy-owls in Texas (Proudfoot and Radomski 1997) or Arizona (Proudfoot *et al.* unpubl. data) has been recorded. Trichomoniasis also can cause mortality of raptors (e.g., Cooper's hawks in Tucson) (Boal *et al.* 1998) that ingest doves and pigeons, but the effects of this disease on pygmy-owls in Arizona is unknown. Most species of raptors in the Tucson area, including small owls such as screech-owls and elf owls, have had documented cases of trichomoniasis (AGFD unpubl. data). House finches and doves are prey items for pygmy-owls in Arizona and are carriers of trichomoniasis (Abbate *et al.* 1999). Recent investigations in Texas

and Arizona have indicated the regular occurrence of avian parasites in the materials inside of pygmy-owl nest cavities. The numbers of parasites may be high enough to impact nestling pygmy-owls. Hence, further study is needed in Arizona and Texas to assess the potential for diseases and parasites to affect pygmy-owl populations. The West Nile Virus has been identified as the cause of a number of unusual raptor mortalities in some areas of the eastern United States. This virus is expanding to the west and the potential for infecting pygmy-owl warrants investigation and development of monitoring strategies.

*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 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. Pygmy-owls flying into windows and fences, resulting in serious injuries or death to the birds, has been documented twice. A pygmy-owl collided into a closed window of a parked vehicle; it eventually flew off, but had a dilated pupil in one eye indicating neurological injury as the result of this encounter (Abbate *et al.* 1999). In another incident, an adult owl was found dead at a wire fence; apparently it flew into the fence and died (AGFD unpubl. data). AGFD also has documented an incident of individuals shooting BB guns at birds perched on a saguaro which contained an active pygmy-owl nest. In Texas, two adult pygmy-owls and one fledgling were killed by a domestic cat. These owls used a nest box about 75 meters from a human residence. In 2001, predation by domestic cats is also suspected by researchers in two instances in northwestern Tucson (AGFD unpubl. data). Free-roaming cats can also affect the number of lizards, birds, and other prey species available to pygmy-owls; however, very little research has been done in the southwest on this potential problem.

### Rangewide Trend

Data collection related to the pygmy-owl has only been consistent throughout the state for the past few years (see Table 2). 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 population size or trend within Arizona. Additionally, the Tohono O'odham Nation supports pygmy-owls, but due to cultural and political constraints, complete information on the numbers or distribution 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 extremely limited in distribution (Monson and Phillips 1981, Davis and Russell 1984, Millsap and Johnson 1988, Proudfoot and Johnson 2000).

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 (Table 2). Data are

insufficient to determine meaningful trends, but it is likely that for the pygmy-owl to persist in Arizona, additional pygmy-owls need to be located, productivity needs to be expanded, and population support from Mexico or artificial augmentation is probably required.

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. The 2000 survey effort resulted in 279 confirmed detections and an 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). While results are not yet available for the 2001 survey work, results were similar to 2000 regarding the numbers and distribution of owls in Sonora (A. Flesch, pers. comm.). In 2000, AGFD personnel documented, through the use of radio telemetry, the movement of a dispersing juvenile pygmy-owl into Mexico from a nest just north of the international border (AGFD unpubl. data). However, while movement of pygmy-owls across the border likely occurs, we have no 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.

Under the current taxonomic classification, cactus ferruginous pygmy-owls also occur in southern Texas. However, recent genetic work (Proudfoot and Slack 2001) may indicate that the pygmy-owls in Texas are genetically distinct from the pygmy-owls in Arizona, possibly to the subspecies level. Regardless of the genetic distinction, pygmy-owls in Texas are found primarily on large private ranches where the level of threats to habitat are reduced from those found in Arizona. Additionally, population numbers are higher and appear to be stable. Pygmy-owl populations in Texas are geographically separated from Arizona and currently provide no genetic or demographic support for Arizona populations.

Since listing in 1997, at least 45 Federal agency actions have undergone formal and informal section 7 consultation throughout the pygmy-owl's range (Table 3). Of these, only one resulted in a draft jeopardy opinion, and that was resolved as a non-jeopardy final opinion. However, many activities continue to adversely affect the distribution and extent of all types of pygmy-owl habitat throughout its range (development, urbanization, grazing, fire, recreation, native and non-native habitat removal, river crossings, ground and surface water extraction, etc.). Stochastic events also continue to adversely affect the distribution and extent of pygmy-owl habitat.

Anticipated or actual loss of occupied pygmy-owl habitat due to Federal or federally permitted projects (Hartman Vistas, Countryside, Dove Mountain, etc.) has resulted in biological opinions that led to acquisition of otherwise unprotected property specifically for the pygmy-owl.

Table 3. Agency actions that have undergone formal and informal section 7 consultation and levels of incidental take permitted for the pygmy-owl in Arizona.

Action (CHU/RA)	Year	Federal Agency	Incidental Take Anticipated
CWA 404 Nationwide Permit Program	2003	ACOE	None
State Route 85 Drainage Improvement Project Organ Pipe Cactus National Monument	2003	NPS	None
Organ Pipe Cactus National Monument General Management Plan	2003	NPS	None
BANWR City Hall Fire Emergency Consultation	2003	USFWS	None
Arivaca Junction Sewer Line	2002	EPA	None
Mission Mine	2002	EPA	No Effect
EPA Approval of the State of Arizona's Pollutant Discharge Elimination System (All CHUs and RAs)	2002	EPA	None
Buenos Aires National Wildlife Refuge Fire Plan (CHU 1/RA1)	2002	USFWS	None
Chaparral Heights Residential Development (CHU 3/RA 3)	2002	EPA	None
Thornydale Road Project (CHU 3/RA 3)	2002	EPA	Take in the form of harassment of 1 pygmy-owl
Tohono O'odham Nation Road Project (Not in a CHU or RA)	2002	BIA	None
Tucson Federal Prison (Not in a CHU or RA)	2002	U.S. Dept. of Justice	MANLAA
Florence Military Reservation (Not in a CHU/RA 6)	2002	AZ Army National Guard	None

Puerto Blanco Road (CHU 5/RA 8)	2002	NPS	None
Coronado National Forest Continuation of Grazing (Not in a CHU or RA)	2002	USFS	None
Buenos Aires National Wildlife Refuge CCP (CHU 1/RA 1)	2002	USFWS	None
Saguaro Canyon Ranch Residential/Commercial Development (CHU 3/RA 3)	2002	EPA	None
5 Grazing Allotments near Ajo (CHU 5/RA 8)	2002	BLM	None
Pueblo Oasis Residential Development (CHU 3/RA 3)	2002	EPA	None
Duval Mine Road Traffic Interchange (Not in a CHU or RA)	2002	USDOT	MANLAA
Butterfly Mountain Residential Development (CHU 3/RA 3)	2002	EPA	None
South Vekol Allotment Reinitiation (Not in a CHU/In RA 7)	2002	BLM	None
Mountain View High School Expansion (CHU 3/RA 3)	2001	EPA	None
Hartman Vistas Residential Development (CHU 3/RA 3)	2001	EPA	None
Safford/Tucson Grazing Program (CHU 1,2,3,4/RA 1,2,3,4)	2001	BLM	Take in the form of harassment for 1 nesting pair + 1 unpaired pygmy-owl
Twin Peaks Road Stabilization (CHU 5/RA 8)	2001	NPS	None
Crescent Ridge Apartments (CHU 3/RA 3)	2001	EPA	None

Catalina State Park Road Project (Not in a CHU or RA)	2001	USFS	None
Ray Mine Land Exchange (Not in a CHU /In RA 5)	2001	BLM	None
Helmet Peak Sand and Gravel (Not in a CHU or RA)	2001	EPA	No Effect
Conley Beloit Grazing Allotment (Not in a CHU/In RA 7)	2001	BLM	None
Saguaro National Park 5-year Trails Plan (CHU 3/RA 3)	2001	NPS	None
Tecolote del Oro Residential Development (CHU 3/RA 3)	2000	EPA	None
Dove Mountain Residential and Commercial Development (CHU 3/RA 3)	2000	EPA	Take in the form of harassment for 1 pair of pygmy-owls
Central Avra Valley Active Recharge Project (CHU 2/RA 2)	2000	EPA	None
AEPCO Electrical Substation (CHU 3/RA 3)	2000	Rural Utility Service	None
Arizona State Prison Expansion (Not in a CHU/RA)	2000	EPA	No Effect
Countryside Vista Residential Development (CHU 3/RA 3)	2000	EPA	None
Blue Point Recreation Site (Not in a CHU/In RA 6)	2000	USFS	None
Lazy K Bar Ranch HCP (CHU 2/RA 2)	1998	USFWS	Take in the form of harassment for 1 nesting pair + young
Kearney Municipal Building Relocation (Not in a CHU/In RA 5)	1998	FEMA	MANLAA

Phoenix RA Management Plan	1998	BLM	None
Lower Gila RA Management Plan	1998	BLM	None
11 National Forests Management Plan	1997	USFS	None
Organ Pipe Cactus NM General Management Plan (CHU 5/RA 8)	1997	NPS	Take in the form of harassment of 15 adults and young

### III. 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 to assess the effects of the action now under consultation.

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, the applicant defines the action area as the project site plus a 600-meter buffer area in which indirect effects could occur to an owl if subsequently located in that buffer. We disagree with this determination. We have determined the action area to include the project site and areas of suitable habitat within 21 miles of the project site. We based this determination on the documented maximum straight-line distance traveled from natal areas for juvenile pygmy-owls in Arizona (AGFD unpubl. data). With so few individual pygmy-owls in Arizona, the maximum travel distance may be periodically needed to maintain genetic interchange between groups of owls. Results of preliminary genetic analysis (Proudfoot and Slack 2001) and observations of incestuous breeding provide evidence that genetic variability may be low within the action area. On two separate occasions in the action area, siblings of the same nest were documented breeding with each other the following year (Abbate *et al.* 1999). Instances of sibling breeding may be a reflection of small isolated populations of owls, and maintaining genetic diversity within depressed populations is important to maintain genetic stochasticity and fitness. AGFD (Abbate *et al.* 1999) has documented movement between pygmy-owls in southern Pinal County and northwest Tucson, therefore, maintaining this genetic interchange is important. Therefore the action area includes known owls within northwest Tucson and southern Pinal County.

The action area includes all of proposed CHU 3 and portions of CHUs 2 and 4. As described above, these units were proposed as critical habitat based on pygmy-owl occupancy status and/or their contribution to habitat connectivity and habitat availability needed for population expansion. Impacts to the past and current function of these CHUs has occurred as a result of capital improvement projects, residential and commercial development, and agricultural activities. In CHU 3 in particular, these activities have affected the amount of available pygmy-owl breeding habitat and have resulted in loss of habitat connectivity and increased fragmentation. The remaining areas of proposed critical habitat in this CHU are very important. The following discussion further elaborates past and ongoing impacts to these CHUs within the action area.

The action area is within the paloverde-cacti-mixed scrub series of the Arizona Upland Subdivision of the Sonoran Desertscrub community. The action area is also characterized by existing and ongoing urbanization, which has had the effect of removing and fragmenting suitable pygmy-owl habitat. During fiscal years 2001 and 2002, we completed 14 formal section 7 consultations and 61 informal section 7 consultations within the action area (e.g., planned residential, commercial, and other developments) and have provided technical assistance to hundreds of individuals seeking to develop single-family residences on individual lots and other non-Federal projects. There are also many projects, primarily single family residences, where we do not have the opportunity for input. We are aware of at least two commercial projects where clearing of vegetation occurred without input from FWS. All of these projects, combined with existing development, contribute to habitat fragmentation and reduce available habitat, particularly in the southern portion of the action area. Areas large enough to provide for successful breeding and dispersal are most limited in the areas to the south and east of the Project.

Dove Mountain and Heritage Highlands, together covering close to 5,600 acres, are mixed-use developments located immediately to the north and west of the project parcel. Consultation was conducted for Dove Mountain and a portion of Heritage Highlands, and actions are being implemented to reduce impacts to pygmy-owls. However, approximately 97 acres of the Heritage Highlands project has been or is being graded and developed without undergoing section 7 consultation. These residential, commercial, and golf developments have removed areas of habitat and contribute to habitat fragmentation but have also set aside significant habitat areas that are suitable for dispersal and breeding. A development proposal, Sky Ranch, is currently developing an HCP in conjunction with an application for a section 10 permit covering over 500 acres of pygmy-owl habitat adjacent to this project. While this development is being planned to reduce impacts to pygmy-owls, the clustered development will result in both further fragmentation of the landscape and permanent conservation of certain nesting, foraging, and dispersal habitat.

A second development, Tangerine Crossing, will cover approximately 300 acres and is located just one mile to the east of this project. Because ongoing dialogue between the owners of Tangerine Crossing and FWS has ceased, it is unknown what effects this project may have on pygmy-owls and critical habitat, nor do we know what contributions this project may make toward conserving the pygmy-owl within the action area. In March 2002, we completed consultation with the EPA on a 100-acre residential development (Butterfly Mountain) adjacent to the project on the east. Butterfly Mountain will result in approximately 17 percent surface

disturbance, but will retain potentially suitable nesting, foraging, and dispersal habitat. A number of project proponents have submitted development proposals to us for the area south and southwest of the proposed project, but they have not entered formal consultation.

In July 2000, we completed a consultation with the EPA for a 20-acre residential development (Countryside Vistas Blocks 5 and 6) approximately 3 miles to the south. In December 2000, we completed a consultation with the EPA for a 29-acre residential development (Tecolote de Oro) approximately 3½ miles to the southeast. In July 2001, we completed a consultation on the 7-acre Crescent Ridge Apartments, approximately 3 miles to the south east. In December 2001, we completed two consultations with the EPA: a 7.86-acre project for Mountain View High School approximately 3 mile to the southeast, and a 141-acre residential development (Hartman Vistas), approximately 3 miles to the south. In February 2002, we completed a consultation with the EPA on improvements to Thornydale Road which will remove 9 acres of suitable habitat approximately 4 miles to the south. In April 2002, we completed consultation with the EPA on a 150-acre residential and commercial development (Chaparral Heights) approximately 3 miles to the southeast of the project site.

While none of the above actions rose to the level of jeopardy, it is clear that portions of the action area for this project are experiencing ongoing loss and fragmentation of habitat that may impact the pygmy-owl in northwest Tucson. This trend is expected to continue. However, some of these activities have had a Federal nexus that resulted in consultation with FWS. As a result, FWS has been able to recommend modifications to activities that would block potential movement or dispersal corridors and permanently set aside either on-site or off-site conservation lands that are beneficial for the survival and recovery of the pygmy owl.

Within the action area, the Town of Marana experienced 467% growth and Oro Valley 310% growth from 1990-1999; the Arizona State Department of Economic Security stated that Marana is one of the two fastest growing communities in Arizona (The Arizona Daily Star 2000b). Housing starts in the area have continued to increase with Marana issuing over 1,000 permits for the first time in 1999 (The Arizona Daily Star 2000a). Pima County's population has grown from 666,000 in 1990 to estimates of at least 850,000 in 2000, or a 30% increase. This annual growth rate has varied from 15,000 to 30,000 persons each year, consuming at the present urban density approximately 7-10 square miles of Sonoran Desert each year (Pima County 2001). Obviously, not all of this growth occurs within the action area. However, as described above, portions of the action area are and will continue to experience impacts from urbanization. New housing construction, and its associated commercial developments and capitol improvements, will continue to contribute to the loss and fragmentation of pygmy-owl habitat within the action area. Existing zoning within the action area includes low, medium and high density residential; specific plans (generally include a mix of residential and commercial uses), and commercial zoning categories.

The action area includes the maximum potential owl dispersal area from the project. However, this area includes lands that are not suitable habitat for the owl. Within the action area, FWS recognizes that the following types of areas do not support suitable habitat: areas higher than 4,000 feet in elevation; active farm fields; and areas of intense urban development and associated infrastructure that no longer support appropriate vegetation components.

Several thousand acres of State Trust land are located in a large continuous block to the north and west of the project site, including approximately 2,400 acres leased for pygmy-owl conservation purposes as part of the Dove Mountain development project. Existing development and development proposals in the northern part of the action area are less extensive than in the southern part. However, State Trust lands may be sold or exchanged and could be used by future owners for development. The extent of development and the ability to address impacts on pygmy-owls on State Trust lands depends on if they are sold or exchanged, the type of development proposed, and the presence of a Federal nexus. Presently, State Trust lands are being leased for grazing. Other activities (e.g., recreational off-road vehicle [ORV] use, shooting/target practice, hunting, etc.) also occur on these lands.

The Recovery Team has prepared a draft recovery plan dated January 2003 for the pygmy-owl (Draft Recovery Plan) and recommended "Recovery Areas" that they believe are necessary for the survival and recovery of the pygmy-owl in Arizona (USFWS 2003). Pertaining to this project, all areas are within a recommended Recovery Area. The team also has recommended specific areas within Recovery Areas for special management (i.e., SMAs) that are of the highest concern because: (1) they contain high concentration of pygmy-owls, particularly nesting owls, that are important sources of young owls to increase the population; (2) pygmy-owl recovery is dependent on the availability of suitable habitat near breeding areas not currently known to have owls where juvenile owls can disperse into and successfully breed; and (3) they are threatened by rapid urban development or other immediate threats. Within the action area, two SMAs have been recommended by the Recovery Team: (1) Northwest Tucson SMA – located generally north of Cortaro Farms Road, south of the 136000 N street alignment, east of Interstate 10, and west of La Cholla Blvd; and (2) Tortolita Fan SMA – containing major washes and upland corridors connecting the Northwest Tucson SMA to southern Pinal County. The project site falls within the Northwest Tucson SMA. The conservation measures that will be incorporated as part of this project are generally consistent with the applicable recommendations of the Draft Recovery Plan.

Researchers in Arizona have found that pygmy-owls require habitat linkages, within and among territories for movement and dispersal, consisting of continuous cover or patches of trees and large shrubs spaced at regular intervals, to provide concealment and protection from predators and mobbing, as well as shade and cool temperatures (Abbate *et al.* 1999, AGFD unpubl. data). Pygmy-owls, particularly juveniles, are susceptible to predation, weather extremes, human-related injury/mortality factors (e.g., cars, buildings, fences, domestic cats, etc.) and other mortality factors (mortality of juveniles is typically 50% or more for owls and other raptors). Therefore, it is essential to maintain habitat conditions that reduce their exposure to these threats and provide

protection as they disperse from their natal areas. A high degree of cover throughout the landscape increases the likelihood of survivorship to the next breeding season. Limiting these mortality factors is critical, especially for small, depressed populations, such as pygmy-owls in Arizona.

In 2002, only a small population (9 adults) of pygmy-owls were known in the action area. Of the known owls, only one is a female, increasing the vulnerability of this population segment to extirpation. This emphasizes the need to maintain the ability of owls within the action area to breed and disperse, particularly to enhance the pairing of known single males. Owl-use in the vicinity of this project has been documented since 1994. In 1994, a pair of owls was located within ½ mile of the project, although no nest was confirmed. In 1995 and 1996, an unpaired owl was detected within ½ mile of the project. In 1998, a nest was located within 1.5 miles and two dispersing juveniles established a breeding territory approximately ½ mile to the west. This pair successfully produced young in both 1999 and 2000. A total of eight pygmy-owl territories have been documented with 3 miles of the project since 2000. In 2002, there were four occupied pygmy-owl territories within three miles of the project. To date in 2003, three of those territories are known to be occupied.

In addition to territorial owls, a number of dispersing juveniles have been documented near the project. In 1997 and 1998, a juvenile was documented each year moving in a northerly direction between one and two miles west of the project. In the fall of 1999, a dispersing juvenile may have crossed the project parcel in the area of Commercial Parcel A based on consecutive telemetry locations. A dispersing juvenile was documented moving west along the south side of Tangerine Road, within 1/4 of a mile of the project, during the fall of 2001. This same owl crossed Tangerine Road and moved north within 1/4 mile of the project's west boundary.

Since 1999, the action area has accounted for approximately 30% of the documented adult owls and 40% of the documented nests in Arizona (Abbate *et al.* 1999, 2000, AGFD unpubl. data). Given the substantial proportion of the statewide documented owl population that this represents, we believe the pygmy-owl group found within the action area is important for the survival and recovery of the owl statewide.

#### **IV. EFFECTS OF THE ACTION**

The proposed action will result in the permanent loss of 172.23 acres of Sonoran desertscrub vegetation which contributes to foraging, sheltering, movement, and dispersal habitat for pygmy-owls in the project vicinity and has the potential to partially support nesting or territorial owls if discovered during surveys or as they disperse from other areas within the action area. Loss of suitable habitat will occur in the Significant Habitat Modification land use category, as described in the BA. This project will also increase fragmentation within the project site. The entire project site contains suitable habitat for the pygmy-owl, and it could provide for each of these life history components. The project site is near existing and proposed urban development.

The action area is within the Northwest Tucson and Tortolita Fan SMAs identified in the draft Recovery Plan. The Recovery Team recommends that areas within SMAs be conserved in a manner that promotes the successful breeding and dispersal of pygmy-owls. The specifics of how

that is to be accomplished should rely upon the best available scientific data. Currently, the best information regarding the amount of development occurring in successfully breeding owl home ranges comes from data being gathered by the AGFD. In home ranges (estimated to be 280 acres in size) where successful nests have been located, disturbance ranged from 16% to 54% with a mean of 33%. There are limitations to the data on which these numbers are based such as the small sample size, the limited number of years over which these data have been gathered, and the absence of data qualifying the disturbance types. However, it represents the best information upon which we can currently base our analysis. This project will result in the disturbance of approximately 29% of the project area. Additionally, if a pygmy-owl establishes a nest within the Property, the project description includes mitigation measures to reduce the impacts.

Surveys for pygmy-owls have been conducted on the project in 2000, 2001, 2002, and 2003. No owls were detected during these survey efforts. We do not believe that this project will directly affect a known breeding site for the owl. However, if an owl does, in the future, establish a territory on or adjacent to the project site, the project proponent will implement measures to avoid direct effects including the application of adequate conservation measures as defined in the development constraints above to ensure noise disturbances will not cause the pygmy-owls to abandon their nest or activity center and a sufficient amount and configuration of suitable habitat will be protected within their territory for it to remain viable for pygmy-owls.

Because there are active nest sites nearby and because dispersal has been documented in the vicinity of the proposed project site, there is a reasonable likelihood that juvenile pygmy-owls may disperse through or onto the project site during construction of this phased development. Dispersing pygmy-owls typically move greater distances during the dispersal period, ranging several miles and over wide areas before selecting a territory, where they will remain throughout the remainder of the fall and winter. The clustered residential development and the two commercial parcels will impact the configuration of dispersal habitat compared to existing conditions but these impacts have been reduced through the amount and configuration of open space conserved on-site. Based on the proximity of this project to a known dispersal pathway and the past history of owl dispersal in relation to the project site, there is a reasonable likelihood that, over time, one or more dispersing juveniles will use this project site. Because of the inconsistent response of owls to the survey protocol, the likelihood that AGFD will not monitor all owls in northwest Tucson with telemetry, and the difficulty in defining owl use areas, we anticipate the possibility that an owl could establish a territory on or adjacent to the project and could be subject to harassment despite the project proponent's efforts to implement the conservation measures outlined in the BA and this opinion. An individual owl may be discouraged from establishing a territory at that location, resulting in altered dispersal behavior. The result of this may be to expose the owl to additional risks, such as predation and additional expenditure of energy. Such harassment may also discourage the establishment of a breeding pair. Given the low numbers of breeding owls, loss of an individual or the opportunity to contribute to the population has significant ramifications.

To support the movement of owls through the project site and vicinity, and to partially offset adverse effects of the removal of dispersal and movement habitat in the project site, Open Space areas within the project site will be established along several major and minor washes and upland areas. These natural open space areas are located in portions of the project site to allow connectivity of suitable habitat within the site and, to a lesser extent, to adjacent areas. The project will maintain substantial areas of riparian vegetation and include other protective measures in the event an owl establishes a territory within or adjacent to the project site.

There are a number of potential indirect effects on pygmy-owls that could result from the development of this project. For example, mortality risks associated with pest control, pollution, collisions with cars, radio towers, glass windows, power lines, and cat predation are often underestimated, although likely increasing in occurrence due to human population growth (Banks 1979, Klem 1979, Churcher and Lawton 1987). Even where human-related deaths are uncommon, they may still substantially affect populations of rare birds (Cartron et al. 2000a). Because of the proximity of pygmy-owl sites to residential areas in northwest Tucson, these interactions may be a significant cause of owl mortality there (Cartron et al. 2000a). It is expected that with this residential development, the number of cats will increase, resulting in increased possibility of predation of pygmy-owls and a reduction in the abundance of pygmy-owl prey species (e.g., lizards, birds) in this area, causing additional adverse impacts to pygmy-owls. It has been documented in Texas that free-roaming cats have killed both adult and fledgling owls. In northwest Tucson, two incidences of likely cat predation have been documented (AGFD unpubl. data). The applicant will establish public education and awareness programs targeting residents to control free-roaming cats in Open Space or where a pygmy-owl territory exists, which will help to reduce or eliminate adverse effects to pygmy-owls and their prey base.

The use of pesticides could affect pygmy-owls indirectly by reducing prey species (e.g., insects, reptiles, birds) within their home ranges and directly if not used in a controlled and targeted manner. The application of pesticides will be limited to the developed areas of the project site and prohibited in the Open Space, helping to reduce impacts in these areas.

The effects that non-directional and high-intensity lighting has on pygmy-owls are unknown. In residential and commercial areas, lighting is expected to increase substantially; however, it is not quantified in the BA. Of particular concern is high-intensity lighting in close proximity of pygmy-owl nests, activity centers, and movement corridors. Increased exposure to predation of adult pygmy-owls and fledglings may occur from great horned owls and other predators where bright lights are used near owl sites. If low-intensity and directional lighting is used to reduce the exposure of pygmy-owls to predation in these areas, adverse effects would be substantially reduced or eliminated.

If either or both commercial properties are developed as apartments rather than commercial uses, the potential indirect effects on a pygmy-owl could be greater. This is due to the fact that indirect effects related to commercial can be limited in time (during business hours depending on the type of commercial), fluctuate depending on the type of development, and usually have less total

human activity than apartments. Impacts associated with apartments occur throughout the day and night, would likely have a higher number of people on site than commercial, and would increase the number of pets, children, traffic, windows, and other indirect effects.

The proposed action could also cause short-term noise disturbance associated with construction and long-term noise disturbance and increased human activity. In the event an owl were present, it is possible that such noise disturbance would impact the owl directly by altering behavior and, indirectly through potential increases in predation, effects on prey species, etc.. However, these impacts have not been quantified during research on pygmy-owls. The project proponent will implement the development constraints discussed in this document related to activities in proximity to owls on and adjacent to the project. This should reduce the impact to owls from noise and disturbance related to construction activities associated with this project.

Vegetation disturbance and activities that cause noise disturbances will be extremely limited within the Open Space per the conservation measures set forth in the project description and this opinion (e.g., ORV, jeep tours, organized events, pesticides, bright lights, and other activities). Because these activities are restricted within Open Space corridors, the corridors should provide connectivity and cover for pygmy-owls and allow for movement through the project site, reducing the impacts of this project on pygmy-owl movements.

### **Interrelated and Interdependent Actions**

Interrelated activities are part of the proposed action that depend on the action for their justification, and interdependent activities have no independent utility apart from the action. No interrelated or interdependent actions have been identified in relation to this project. Direct and Indirect effects are discussed in the section above.

### **Critical Habitat**

This entire project falls within Unit 3 of the recently proposed critical habitat for the pygmy-owl (U.S. Fish and Wildlife Service 2002). All of the primary constituent elements (PCEs) defined in the proposed rule designating critical habitat are found within the project boundaries. Constituent elements containing components essential for nesting, rearing of young, roosting, sheltering, and dispersal will be removed in a portion of this area. These elements include Sonoran desertscrub and xeroriparian vegetation containing saguaro cactus, and large diameter trees, including ironwood, palo verde, mesquite, etc. These primary constituent elements will be eliminated on 172.23 acres within the project boundaries. Impacts from this project will affect PCE 5 (U.S. Fish and Wildlife Service 2002) over a greater acreage than the 172.23 acres being developed. PCE 5 deals with the configuration of habitat and activities related to pygmy-owl movements. Planned development in the northwest corner of this project will result in barriers or impediments to movement on approximately 15 - 20 acres beyond the planned removal of habitat for high-density residential use (lost function in addition to the physical loss of habitat). As a result, total impacts to proposed critical habitat are approximately 190 acres. This equals approximately 0.2% of Critical Habitat Unit 3. However, the actual percentage of critical habitat removed is somewhat

higher since not all areas within the boundaries of critical habitat contain primary constituent elements (U.S. Fish and Wildlife Service 2002). Movement corridors will be maintained through the project site to allow for the movement of owls through the area. The conservation measures described above and in the BA should maintain the function and viability of proposed critical habitat in Unit 3.

### **Summary**

Based on the current status of the pygmy-owl in Arizona, survival and recovery of the pygmy-owl will likely require not only protection of all known sites, but also the conservation of other areas not currently known to have nesting owls. This can be measured at two spatial scales. At a large scale, connectivity is necessary among large blocks of suitable habitat that are either currently known to have nesting owls or are important for recovery. This project contains measures to ensure that connectivity between large blocks of habitat are maintained. At a finer scale, the protection of habitat within the vicinity of known owl sites for establishment of new sites and movement between them is also essential. The Northwest Tucson and Tortolita Fan SMAs account for a substantial proportion of the documented owls and nests in Arizona. They also contain habitats not currently known to have nesting owls that are likely important for the expansion of the population within the action area. Measures implemented as a part of this project will help to maintain habitat components contributing to fine scale movements of pygmy-owls in the vicinity of known sites.

Significant Habitat Modification land uses will permanently remove approximately 172 acres of suitable nesting, foraging, sheltering habitat. Movement and pygmy-owl dispersal corridors will also be affected in these areas. Direct effects to nesting and dispersal habitat have been minimized and addressed through the conservation measures outlined in this opinion and the BA. Indirect effects associated with the development are anticipated but are also addressed in the conservation measures outlined in this opinion.

A maximum of 29% of the project site will have vegetation removed or disturbed, with 71% of the area maintained as natural open spaces. The removal of this amount of pygmy-owl habitat in the vicinity of rapidly urbanizing northwest Tucson will result in impacts to pygmy-owls in Arizona. Because the project proponents have incorporated a large area of undisturbed open space within the development; because management activities on these lands will be conducive to the conservation of the pygmy-owl in accordance with measures contained in this opinion; and because of the extent of undisturbed or low-density disturbance present adjacent to the project boundaries, it is our opinion that the direct and indirect effects of this project on pygmy-owls and on pygmy-owl critical habitat are being addressed considering the best available science and the intent of recommendations made by the Recovery Team (USFWS 2003) for minimizing impacts to the Arizona pygmy-owl population.

## V. 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 draft 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.

The action area is subject to ongoing residential and commercial development pressures, and State, local, and private actions are expected to continue with various levels of development immediately to the south and east and, to a lesser extent, northwest of the project site and elsewhere in the action area. Activities occurring within jurisdictional waters and wetlands of the U.S. require a section 404 permit under the CWA from the COE and, as a result, would be subject to future section 7 consultation and are not considered under cumulative effects. During the course of consultation, the project proponent provided us with information and statistics concerning zoning and development levels within the portion of the action area proposed as critical habitat. We considered this information during our analysis of cumulative effects, and utilized those portions of that information that we deemed to be determinative.

In the past, any activity clearing five acres or more required a NPDES section 402 permit under the CWA from the EPA. However, the NPDES program was recently transferred to the State of Arizona Department of Environmental Quality, and as a result, projects requiring such a permit will no longer have a Federal nexus if the project does not require a permit from the COE. Many of these projects that were not formerly considered under cumulative effects because of their Federal nexus and section 7 process now need to be included in this analysis. Some of these projects may address impacts to owls through another process (Habitat Conservation Plans (HCP) under section 10 of the ESA) and could be excluded from this cumulative effects analysis, but such participation is voluntary. Aside from HCPs already in development, it is difficult, if not impossible, to predict which parcels may choose to pursue an HCP. Therefore, the scope of the cumulative effects analysis for this project covers all activities not likely to require a 404 permit from the COE.

The action area has been subject to significant development activities, and while development will likely continue at some level, there have been a number of recent lower-density developments proposed, such as Butterfly Mountain and Saguaro Canyon Ranch. In addition, some development projects have chosen to cluster development at higher densities, leaving larger blocks of undisturbed desert and wash vegetation (Dove Mountain and Sky Ranch). Both of these approaches reduce the level of cumulative effects on pygmy-owls. Some areas have been down-planned (recent plans recommend lower density development than previous plans), but build out at these lower densities is dependent on a number of factors including market, existing zoning, and intentions of the landowner. Much of the private land in the area is zoned for low-density residential uses that would have reduced effects on the pygmy-owl. However, past development has often occurred on parcels with low-density zoning that was rezoned to a higher density. Based on projects with which we are familiar, this trend is likely to continue, but probably to a reduced extent.

The Baseline Conditions describe an action area that is already developed and fragmented, primarily in the area to the south of this project. As a result, any additional loss or fragmentation of pygmy-owl habitat may impact the species' ability to persist on the landscape. So while development trends, zoning, and planning are beginning to provide a scenario where cumulative effects may be reduced, any cumulative effects, particularly in the area south and east of the project site, may still have a considerable impact on the pygmy-owl.

Many small, undeveloped parcels used primarily for single-family dwellings will not require a Federal permit or other Federal nexus and will continue to be built without FWS consultation. This is particularly important in the action area due to the large number of undeveloped small parcels zoned as SR and low-density residential areas that, if developed, will further reduce the amount of suitable habitat, increase fragmentation, and degrade habitat conditions. Since 1999, we are aware of nine projects within the action area, totaling approximately 900 acres, that have received Federal permits, but removed suitable pygmy-owl habitat without undergoing section 7 consultation. These projects could be considered as having cumulative effects based on the lack of section 7 consultation.

As stated above, this area supports one of the highest documented concentrations of pygmy-owls in the State. We are aware of a number of potential residential and commercial developments, schools, churches, etc. in the action area that may further reduce and fragment pygmy-owl habitat in this area. Some of these projects may not be reasonably certain to occur based on our guidelines, but the development history of this area and apparent trends indicate that there is a likelihood that they will. This area, in general, is currently experiencing rapid growth in new home sales and development. Since the listing of this distinct population segment in Arizona, housing construction has continued to increase in the Tucson area. For example, in May 1999, new-home closings were a record 467 units, higher than any other May within the past decade (The Arizona Star 1999). In 1999, Tucson-area building permits were 10.9% more than in 1988, and topped 7,000 for the first time. Permits were highest in northwest Tucson and, for the first time, Marana issued more than 1,100 permits, with a strong building trend expected to continue steady or increasing (The Arizona Star 2000a). We have received, and continue to receive notification of numerous new housing subdivisions and commercial developments in this region as well. During the period from 1990 - 1999, the number of people living in Marana grew by 467%; the Arizona State Department of Economic Security stated that Marana is one of the two fastest growing communities in Arizona (The Arizona Daily Star 2000b). Not all of the growth and development represented by the above discussion does or will occur in areas that affect the pygmy-owl. However, given the presence of high-density and commercial zoning, the past rezoning of parcels from low density to higher densities, and recent growth trends in the vicinity of this project, it is reasonably certain that cumulative effects within the action area are likely impact pygmy-owl survival and recovery within the action area.

## **VI. CONCLUSION**

After reviewing the current status of the pygmy-owl, the environmental baseline for the action area, the effects of the proposed residential and commercial development, and cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued

existence of the pygmy-owl. While this project does occur within proposed critical habitat for the pygmy-owl, the amount of undisturbed vegetation and the conservation measures identified in this opinion and BA address the impacts and effects of development, and it is our conference opinion that the proposed development is not likely to result in the destruction or adverse modification of proposed critical habitat. These conclusions are based on the record of this consultation including the BA, correspondence and meetings with the project proponents, the information outlined in this Biological Opinion, and the following:

- 1) The project site is not within a known territory of a pair or resident pygmy-owl, therefore the likelihood of lethal take is minimal.
- 2) Conservation measures will be implemented to minimize noise and vegetation disturbance if a pygmy-owl shows up on the project site prior to and/or after commencement of construction, reducing the extent of direct effects.
- 3) Conservation measures will minimize the indirect effects of this development on pygmy-owls.
- 4) Habitat disturbance will not exceed 172.23 acres (0.2% of proposed Critical Habitat Unit 3) and the disturbance will occur in configuration that will still allow the potential for nesting and movement, therefore effects to do not rise to the level of adverse modification of proposed critical habitat.
- 5) The effects of losing 172.23 acres of suitable habitat and the associated PCEs will be minimized through the protection of 425.44 acres of Open Space managed for conservation purposes. These lands will be managed in a manner that will protect suitable habitat for the pygmy-owl and contribute to its conservation.
- 6) Open Space will maintain connectivity within the project site and to adjacent suitable habitat areas offsite, minimizing adjacent cumulative effects.
- 7) Open Space will provide habitat suitable for breeding, sheltering, feeding, and movement, partially offsetting adjacent cumulative effects.

### **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 (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 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.

The measures described below are non-discretionary, and must be undertaken by the COE so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The COE has a continuing duty to regulate the activity covered by this incidental take statement. If the COE (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the applicant must report through the COE the progress of the action and its impact on the species to the FWS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

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

We do not anticipate that the proposed action will incidentally take, in the form of harm, death, or injury, a pygmy-owl. There are no currently known nesting or resident pygmy-owl sites or portions of their home range (within 600 meters) in the project site. However, because nesting owls do occur in the action area and dispersal has occurred in proximity to this project, we anticipate that, for the development phase of a project such as this, it is reasonably likely that a pygmy-owl home range could be established within or in the immediate vicinity of the project site (within 600 meters) during dispersal and establish an activity center. A pygmy-owl establishing a home range could be affected by construction noise, dust, traffic, or other human activity in connection with the construction or utilization of the developments. In the event an activity center is established on or immediately adjacent to the project site, the project description includes conservation measures such that FWS does not anticipate that these activities will constitute incidental take.

We anticipate that a dispersing juvenile could be subject to harassment prior to the implementation of conservation measures due to the inconsistency of the survey protocol, limited nature of telemetry monitoring, and the difficulty of defining owl use areas. Generally, we believe that the construction measures adopted by the project proponent, as a result of this consultation, will reduce any effects on pygmy-owls to a level below that at which take would occur. It is our opinion that any impacts to nesting pygmy-owls will be avoided through the conservation measures included as part of the proposed action. However, it is possible that non-lethal incidental take (in the form of harassment only) of a resident pygmy-owl could occur if a pygmy-owl establishes a territory within 600 meters of expected or ongoing development activity and it is not detected through implementation of the survey protocol. Because of the limited duration of the construction period and the low density of owls within the action area, it is unlikely that this form of take would occur more than once during the construction and operation of this project. Therefore, incidental take in the form of harassment for one pygmy-owl is anticipated for this project.

**Effect of the take**

In the accompanying biological and conference opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

**Reasonable and Prudent Measures**

Pursuant to section 7(b)(4) of the ESA, we believe the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of the pygmy-owl. In order to be exempt from the prohibitions of section 9 of the Act, the COE and applicant must comply with the terms and conditions, which implement the reasonable and prudent measures and outline required reporting/monitoring requirements. The terms and conditions are non-discretionary.

1. Minimize vegetation disturbance, loss of key habitat components, impacts to habitat connectivity and other potential adverse effects to pygmy-owls which are detected prior to or following the commencement of the clearing of vegetation for a construction phase within the estimated home range of a resident pygmy-owl.

In addition to the project description and conservation measures found with the BA and this opinion, the following terms and conditions are necessary to implement Reasonable and Prudent measure 1:

- 1.1 If FWS or the project proponent become aware of a pygmy-owl Territory Center within 600 meters of project areas subject to development activity, they shall immediately notify each other. There shall be no additional clearing of vegetation on the Property within the 600 meter area until FWS and the project proponent conduct a site specific analysis regarding this new information and the effects of ongoing and proposed activities to the pygmy-owl.
- 1.2 No more than 25% vegetation disturbance shall occur within 600-meters of a pygmy-owl Territory Center.
- 1.3 The project proponent shall conduct public education and awareness programs and develop measures that reduce or eliminate free-roaming cats within 600-meters of a pygmy-owl Territory Center, and reduce or eliminate cats within Protected Open Space to minimize potential adverse effects to pygmy-owls. If apartments are developed on either or both commercial parcels, the project proponent shall conduct public education and awareness for tenants related to the conservation of open space and restricted activities within the open space.
- 1.4 FWS and the project proponent shall review development plans within 600 meters of pygmy-owl Territory Center to ensure that habitat retained has an appropriate configuration of constituent elements.

- 1.5 The project proponent shall provide educational information to construction crews working adjacent to protected open space for all new grading and construction activity. The purpose of the educational information is to inform crews of these terms and conditions, to minimize vegetation disturbances that may affect owl movements, and to ensure maintenance of job site perimeters. A copy of all educational materials will be provided to the FWS prior to dissemination.
2. Minimize noise and light disturbance immediately adjacent to a pygmy-owl nest or activity center which is detected prior to or following the commencement of clearing vegetation for a construction phase.

In addition to the project description and conservation measures found within the BA and this opinion, the following terms and conditions are necessary to implement Reasonable and Prudent Measure 2:

- 2.1 Blasting, land clearing, or other construction activity which has a greater noise intensity than existing baseline conditions shall occur outside of the breeding season (February 1 through July 31) within a 400-meter radius of a nest or activity center.
- 2.2 The project proponent shall minimize all human activities in all areas designated as Open Space that may cause substantial noise disturbances that could disturb breeding and non-breeding pygmy-owls.
- 2.3 Only directional and low-intensity lights shall be used within 100 meters of a new nest site or activity center to minimize adverse effects to resident pygmy-owls.
3. Monitor development activities within 600 meters of a Territory Center and conservation measures identified in this opinion, to ensure compliance with the terms and conditions listed below. Report the findings of this monitoring to FWS and, if measures have not been met, identify corrective measures that will be taken.

In addition to the project description and conservation measures found with the BA and this opinion, the following terms and conditions are necessary to implement Reasonable and Prudent Measure 3:

- 3.1 The project proponent shall submit to FWS an annual (by January 1 of each year until development activities are completed) written report and maps to keep FWS informed of the status of activities (e.g. pygmy-owl surveys, ongoing and completed construction phases, etc.) and compliance with these terms and conditions. In addition, the applicant shall seek technical assistance from FWS in implementing these terms and conditions in a manner most effective for minimizing impacts to pygmy-owls.

FWS believes it is possible that non-lethal incidental take (in the form of harassment only) of a resident pygmy-owl could occur if a pygmy-owl establishes a territory within 600 meters of ongoing development activity. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with us the need for possible modification of the reasonable and prudent measures.

### **Disposition of Dead or Injured Listed Animals**

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the FWS's Division of Law Enforcement, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (602/261-6443) 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, and any other pertinent information. 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 as soon as possible to the nearest Fish and Wildlife Service or AGFD office, educational, or research institutions (e.g., University of Arizona in Tucson) holding appropriate state and Federal permits.

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

### **CONSERVATION RECOMMENDATIONS**

Sections 2(c) and 7(a)(1) of the ESA direct 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 pygmy-owl. In furtherance of the purposes of the ESA, we recommend implementing the following discretionary actions:

1. The COE should conduct or fund studies using both monitoring and telemetry, to determine pygmy-owl habitat use patterns and relationships between owls and the human interface in northwest Tucson. Surveys involving simulated or recorded calls of pygmy-owls require an appropriate permit from the FWS. AGFD should also be contacted in regard to state permitting requirements.

2. The COE should continue to actively participate in regional planning efforts, such as Pima County's SDCP and the Town of Marana's HCP, and other conservation efforts for the pygmy-owl.
3. The COE should assist in the implementation of recovery tasks identified in the pygmy-owl Recovery Plan when approved by FWS.
4. The COE should monitor the effectiveness of conservation measures associated with issuance of authorized permits.

### **REINITIATION NOTICE**

This concludes formal consultation for development on the project site located in Section 36 of Township 11 South, Range 12 East in Marana, 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) any incidental take not authorized herein occurs, (2) new information reveals effects of the agency action that may adversely 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 way that causes an effect to a listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by this action. In instances where any incidental take not authorized herein occurs, any operations causing such take must cease pending reinitiation.

We have assigned log number 02-21-02-F-0544 to this consultation. Please refer to that number in future correspondence on this consultation. Any questions or comments should be directed to Scott Richardson at (520) 670-4643 or Sherry Barrett at (520) 670-4617.

Sincerely,

/s/ Steven L. Spangle  
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)  
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ  
U.S. Army Corps of Engineers, Phoenix, AZ (Att: Robert Dummer)

Regional Supervisor, Arizona Game and Fish Department, Region 5, Tucson, AZ  
Town of Marana, Marana, AZ (Attn: Mike Reuwsaat)  
Santa Rita Land Corporation, Tucson, AZ (Attn: Bill Hallinan)

**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.
- Abouhalder, F. 1992. Influence of livestock grazing on saguaro seedling establishment. Pp 57-61 in C.P. Stone and E.S. Bellantoni (eds.), Proceedings of the Symposium on Research in Saguaro National Monument, Tucson
- Arizona Game and Fish Department (AGFD). 1999. Heritage management data system. Nongame Branch, Arizona Game and Fish Department, Phoenix.
- American Birding Association. 1993. Good birds from the hotline - April 1993. Winging It 5(5): 3.
- 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. 1888. Notes on the habits, nests and eggs of the genus *Glaucidium boie*. Auk 5:366-372.
- 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.

- 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. 2000. 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. 2000a. 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.
- 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., No. 142.
- 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. 34 pp.
- Davis, W.A. and S.M. Russell. 1984. Birds in southeastern Arizona. 2nd ed. Tucson Audubon Soc., Tucson, AZ.
- Earhart, C.M and N.K. Johnson. 1970. Size dimorphism and food habits of North American owls. *The Condor* 72: 251-264.
- 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.
- Fleming, T.H., R.A. Nunez, and L.S.L. Sternberg. 1993. Seasonal changes in the diets of migrant and non-migrant nectarivorous bats as revealed by carbon stable isotope analysis. *Oecologia* 94:72-74.

- 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. 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.
- Gentry, H.S. 1982. Agaves of Continental North America. Univ. of Arizona Press, Tucson.
- 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 "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.
- Hoffmeister, D.F. 1986. Mammals of Arizona. University of Arizona Press.
- 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.
- Hoyt, R.A., J.S. Altenbach, and D.J. Hafner. 1994. Observations on long-nosed bats (*Leptonycteris*) in New Mexico. *Southwestern Naturalist* 39:175-179.
- 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. *Smithson. 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.
- 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* R.L. Glinski *et al.*, eds. Proceedings of the Southwest Raptor Management Symposium and Workshop. Nat'l. Wildl. Fed., Washington, D.C. 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.
- O'Neil, A.W. 1990. Letter in Appendix B in Tewes, M.E.. 1993. Status of the ferruginous pygmy-owl in southern Texas and northeast Mexico. Proj. Rep. 2, Job 25, Texas Parks and Wildlife Dept. and Texas A&M Univ.-Kingsville.
- 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. 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 (*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.
- Sahley, C.T., M.A. Horner, and T.H. Fleming. 1993. Flight speeds and mechanical power outputs in the nectar feeding bat, *Leptonycteris curasoae* (Phyllostomidae: Glossophaginae). *J. Mammal.* 74:594-600.
- Sidner, R. 1997. Eighth annual monitoring of the lesser long-nosed bat (*Leptonycteris curasoae*) and other species of bats with emphasis on roost sites on the Fort Huachuca Military Reservation, Cochise County, Arizona, May-October, 1997 (draft). Report to Fort Huachuca, Contract #DABT63-97-P-0623.
- Slauson, L. 1996. Pollination ecology of *Agave chrysantha* and *Agave palmeri*. Pp. 154-203 in *Amorphometric and Pollination Ecology Study of Agave chrysantha Peebles and Agave palmeri Englem. (Agavaceae)*. Ph.D. Diss., Arizona State Univ., Tempe.
- Slauson, L. 1999. Pollination biology of two chiropterophilous agaves in Arizona, Draft. Desert Botanical Garden, Phoenix.
- Slauson, L., G. Dalton, and D. Dalton. 1998. Effects of prescribed burning on the Palmer agave and lesser long-nosed bat. Research Joint Venture Agreement No. 28-JV7-943.
- Sprunt, A. 1955. *North American birds of prey*. The National Audubon Society, Harper and Brothers, New York. 227 pp.
- Sutton, G.M. 1951. *Mexican birds: first impressions*. Univ. of Oklahoma Press, Norman.
- 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.
- The Arizona Star. 2000a. Area home permits passed 7,000 in '99. Newspaper article. January 7, 2000.
- The Arizona Star. 2000b. Suburb rush - newcomers piling into booming northwest. Newspaper article. April 2, 2000.
- Tropical Birds of the Border. 1994. Sixth annual Rio Grande birding festival. Harlingen, Texas.
- 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. Fed. Regist. 62:10730-10747.
- U.S. Fish and Wildlife Service (USFWS). 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 (USFWS). 1997b. Lesser long-nosed bat recovery plan. Albuquerque, New Mexico. 49pp.
- 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. Regist. 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*). Fed. Regist. 67:71032-71064
- WestLand Resources. 2002a. Biological assessment for development in Section 36, Township 11 South, Range 12 East. Rita Land Corporation prepared for the U.S. Environmental Protection Agency. May 2002. 42 pp. + appendices.
- WestLand Resources. 2002b. Revised biological assessment for development in Section 36, Township 11 South, Range 12 East. Rita Land Corporation prepared for the U.S. Environmental Protection Agency. November 2002. 40 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 – preliminary results. Region V Wldlf. Prog. Rep. Arizona Game and Fish Dept., Tucson.
- Wilson, D.E. 1985. Status report: *Leptonycteris sanborni* Hoffmeister, Sanborn's long-nosed bat. US Fish and Wildlife Serv., Denver Wildlife Res. Center, Nat'l. Mus. Nat. Hist., Washington D.C. 35pp.

**Appendix A****APPENDIX A - CONCURRENCE**

We concur with the applicant's determination that the proposed action may affect, but is not likely to adversely affect, the lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*). The rationale for this concurrence is detailed in the following discussion.

**STATUS OF THE SPECIES**

The lesser long-nosed bat is one of four members of the tropical bat family *Phyllostomidae* which are found in the United States. It was formally separated from the Mexican long-nosed bat (*L. nivalis*) as a distinct species (*L. sanborni*) by Hoffmeister (1986). It has a long muzzle, a long tongue, and is capable of hover flight. These features are adaptations that allow the bat to feed 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*).

The lesser long-nosed bat is a medium-sized bat with a forearm measuring 51 to 56 mm (2.0-2.2 in) and weighing 20 to 25 grams (0.7-0.9 oz) as an adult. Adult fur is grayish to reddish-brown; juveniles have gray fur. Its elongated rostrum bears a small, triangular noseleaf, its ears are relatively small and simple in structure, and it has a minute tail. It is generally smaller in external and cranial measurements than *L. nivalis*. *L. curasoae* can be distinguished from the Mexican long-tongued bat (*Choeronycteris mexicana*), with which it co-occurs in Arizona, by the larger size, less elongated snout, and tiny tail.

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. In southern Arizona lesser long-nosed bat roosts have been found from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County) and south to the international boundary. Individuals have also been observed from the vicinity of the Pinaleno Mountains (Graham County) and as far north as the McDowell Mountains (Maricopa County) (AGFD 1999). This bat is also known from far southwestern New Mexico in the Animas and Peloncillo Mountains (Hidalgo County). It is a seasonal resident in Arizona, usually arriving in early April and leaving in mid-September to early October. It resides in New Mexico only from mid-July to early September (Hoyt et al. 1994).

Roosts in Arizona are occupied from late April to October (Cockrum and Petryszyn 1991, Sidner 1997). In spring, adult females, most of which are pregnant, arrive in Arizona and gather into maternity colonies in southwestern Arizona. These roosts are typically at low elevations near concentrations of flowering columnar cacti. Litter size is one. After the young are weaned these colonies disband in July and August; some females and young move to higher elevations, ranging up to more than 6,000 ft, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Actual dates of these seasonal movements are rather variable from one year to the next (Cockrum and Petryszyn 1991, Fleming et al. 1993). Adult males typically

occupy separate roosts forming bachelor colonies. Males are known mostly from the Chiricahua Mountains but also occur with adult females and young of the year at maternity sites (USFWS 1997b). Throughout the night between foraging bouts both sexes will rest in temporary night roosts.

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. In Arizona, four species of agave and two cacti are the main food plants (Wilson 1985). The agaves include Palmer's agave, Parry's agave, desert agave (*A. deserti*), and amole (*A. schotti*). Amole is considered to be an incidental food source. The cacti include saguaro and organ pipe cactus. Nectar of these cacti and agaves are high-energy foods. Concentrations of food resources appear to be patchily distributed on the landscape and the nectar of each plant species utilized is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available through the summer, primarily from July through early October, though Parry's agave blooms earlier. Columnar cacti occur in lower elevation areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desertscrub areas, desert grasslands and shrublands, and into the mountains. Parry's agave is usually found at higher elevations than Palmer's agave (Gentry 1982). The bats are generally considered to time their movement and feeding to the progression of flowering associated with these cacti and agaves. Many species of columnar cacti and agaves appear to provide a "nectar corridor" for lesser long-nosed bats as they migrate in spring from Central America and Mexico to as far north as southern Arizona, through fall when they return south (Gentry 1982, Flemming et al. 1993, Slauson et al. 1998).

Lesser long-nosed bats appear to be opportunistic foragers and efficient fliers, capable of flight speeds up to 23 km per hour (14 mph) (Sahley et al. 1993), and often foraging in flocks. 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 mi, and in Mexico at 25 mi and 38 mi (one way) (Dalton et al. 1994, V. Dalton, pers. comm., Y. Petryszyn, University of Arizona, pers. comm.). A substantial portion of the lesser long-nosed bats at the Pinacate Cave in Sonora (a maternity colony) fly 25-31 mi each night to foraging areas in Organ Pipe Cactus National Monument (USFWS 1997b). Horner et al. (1990) found that lesser long-nosed bats commuted 30-36 mi round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 50-62.5 mi. each night. Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest potential roost site (Petryszyn, pers. comm.).

Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (USFWS 1997b). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever the factors are that determine selection of roost locations, 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.

Food requirements of the lesser long-nosed bat are very specific. Adequate numbers of flowers or fruits are required within foraging range of day roosts and along migration routes to support large numbers of this bat. Locations of good feeding sites play an important role in determining availability of potential roosting sites, and roost/food requirements must be considered jointly when discussing the habitat requirements of this bat. A suitable day roost is probably the most important habitat requirement, but potentially suitable roosts must be within reasonable foraging distances of sufficient amounts of required foods before this bat will use them. It seems evident that the lesser long-nosed bat forages over wide areas and that large roosts require extensive stands of cacti or agaves for food. Therefore, destruction of food plants many miles from a roost could have a negative impact on this bat (USFWS 1997b).

The lesser long-nosed bat recovery plan (USFWS 1997b) 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.

Known major roost sites include 16 large roosts in Arizona and Mexico (USFWS 1997b). 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 a total of more than 150,000 lesser long-nosed bats. The numbers above indicate that, although many of these bats are known to exist, the relative number of known large roosts is small. Disturbance of these roosts and 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.

## **ENVIRONMENTAL BASELINE**

Current and past environmental conditions in the project area are summarized in the environmental baselines for the pygmy-owl. They are included here by reference.

*Leptonycteris* bats require suitable forage plants (paniculate agaves and columnar cacti) and suitable roost sites. Mines and caves occurring in southern and central Arizona provide suitable sites for post-maternity roosts of the lesser long-nosed bat. Potential foraging habitat (saguaros) for the lesser long-nosed bat occurs in the project site and vicinity. Agaves are found in varying densities and age classes within residential areas. They are found within the broad vegetation community classification of desert scrub, desert grassland, interior chaparral, oak woodland, pinyon-juniper woodland, pine-oak woodland, and mixed conifer in areas of the Coronado National Forest (Forest) and other areas in the region. The primary agave used by the bat is Palmer's agave, which, as estimated by the Forest, is widely scattered over 1,000,000 ac at

densities of 10-200 per ac, generally between the elevations of 3,000-6,000 ft. Parry's agave is found between 5,000-8,200 ft, and begins blooming in mid-spring. Neither species occurs within the action area.

Considerable evidence exists suggesting a dependence of *Leptonycteris* on certain agaves and cacti, although some Palmer's agave has been shown not to be dependent on *Leptonycteris* for pollination (Slauson 1996 and 1999, Slauson and Dalton 1998). Activities that adversely affect the density and productivity of columnar cacti and paniculate agaves may adversely affect populations of lesser long-nosed bats (Abouhalder 1992, USFWS 1997b). Excess harvest of agaves in Mexico, collection of cacti in the United States, and conversion of habitat due to urban expansion, agricultural uses, livestock grazing, and other development may contribute to the decline of long-nosed bat populations (USFWS 1988a).

### **Status of the Species in the Project Area**

No documented lesser long-nosed bat maternity colonies are known from the project site; however, there is a roost in the Picacho Mountains, approximately 30 miles to the northwest and a suspected maternity colony on Saguaro National Park in the Rincon Mountains, approximately 38 mi to the southeast (USFWS 1997b). Numbers of bats at this site have fluctuated widely from year to year, from several hundred to zero. Several post-maternity roosts which house from many thousands to only a few individual bats are also known from various locations in the region, the nearest being about 25 mi to the northeast of the project site (AGFD 1999). These roosts are generally occupied from July through September, though the bats have been recorded in southeast Arizona in April (Petryszyn, pers. comm.) and they may remain into October (Sidner 1997). Based on distances lesser long-nosed bats have been known to travel from roost sites to foraging areas, potential foraging habitat may extend in a 40-mile radius from roosts. From the known roosts in southeastern Arizona, the project site lies within potential foraging range of the lesser long-nosed bat.

### **EFFECTS OF THE ACTION**

The severity of adverse effects to *Leptonycteris* bats resulting from the potential reduction in forage resources is dependent on the importance of forage plants in a specific area to reproduction, survival, and growth of the bat. Indirect effects from residential developments in the action area on *Leptonycteris* bats may occur through adverse effects to forage plants, primarily paniculate agaves and saguaros. Both direct and indirect impacts, resulting from continued urban development, may occur to forage plants, particularly saguaros. Saguaros are documented on the project site.

The primary food source for the lesser long-nosed bat in southeastern Arizona from mid-summer through fall are Palmer's and Parry's agave, neither of which occur on the parcel. Documented bat use in the action area consists of few, mostly old records. There is a roost in the Picacho Mountains to the northwest, and a suspected maternity colony on the neighboring Saguaro National Park in the Rincon Mountains. Both are within 40 miles which is the documented foraging distance of the bat.

**CONCLUSION**

*Leptonycteris* bats are opportunistic foragers, are capable of long distance flights, and potentially could forage in the project site. However, because of the distance from known roost and maternity sites and the maintenance of 425 acres of Open Space on the parcel, we concur with the EPA's determination that this action, as proposed, may affect, but is not likely to adversely affect, the lesser long-nosed bat. Critical habitat has not been designated for the bat; therefore, none will be affected. We base this finding on the following:

1. Potential direct adverse effects to the species are expected to be discountable (i.e., extremely unlikely to occur), as no roosts occur within the project area.
2. Indirect adverse effects are considered insignificant (i.e., small size, extent of the impacts). Neither Palmer's nor Parry's agave occur on site. The loss of saguaros on site will be small compared to the number and distribution of saguaros within the action area.
3. The proposed action includes conservation of native plants, including saguaros, in accordance with the conservation program approved by the Town of Marana.