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AESO/SE
02-21-03-F-0417 February 26, 2004

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Chief, Arizona Section
Regulatory Branch
U.S. Army Corps of Engineers
Arizona-Nevada Area Office
3636 North Central Avenue. Suite 900
Phoenix, Arizona 85012-1939

File Number: 2003-01174-MB

Dear Ms. Lester:

This letter is in response to your September 16, 2003 request for section 7 consultation procedures on the effects of the Estates at Tortolita Preserve residential development project in the Town of Marana, Pima County, Arizona (T11S, R12E, Sec. 26) on the endangered cactus ferruginous pygmy-owl (pygmy-owl) (*Glaucidium brasilianum cactorum*) and its proposed critical habitat, and the endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

Specifically, you requested formal consultation on the effects of the action on the pygmy-owl, formal conference on its critical habitat, and 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 effects of the proposed action on the pygmy-owl and its proposed critical habitat and is based on: (1) information provided in the August 19, 2003 Biological Assessment and the December 8, 2003 revised Biological Assessment (collectively BA) prepared by Darling Environmental and Surveying, Ltd. for the U.S. Army Corps of Engineers (ACOE) on behalf of Moore Corridor Ltd. Partnership (Applicant); (2) the August 2003 Preconstruction Notification Application for a section 404 permit, prepared for the ACOE on behalf of the applicant; (3) the October 28, 2002 Specific Plan for The Estates at Tortolita Preserve submitted by Arcadis G&M, Inc.; (4) various correspondence and meetings among the Applicant, their consultant, the Arizona Game and Fish Department (AGFD), and us; and (5) other sources of published and unpublished information. A complete administrative record of this consultation is on file at this office. We have assigned log

number 02-21-03-F-0417 to this project. Please refer to that number in future correspondence on this consultation.

BIOLOGICAL OPINION

Consultation History

- October 22, 2002: Meeting with applicant, applicant's consultant, and us to discuss conservation measures and consultation process.
- November 1, 2002: We received a copy of the Specific Plan for The Estates at Tortolita Preserve.
- August 8, 2003: Letter from applicant's consultant to us regarding ACOE Nationwide Permit program guidelines for the pygmy-owl.
- August 21, 2003:We received copy of the preconstruction notice sent by the applicant's consultant to ACOE.
- September 9, 2003: We sent a reply letter to the August 8, 2003 letter from applicant's consultant.
- September 22, 2003: We received BA and request for consultation from ACOE.
- December 8, 2003: We received revised BA from Applicant's consultant.
- December 31, 2003: Draft BO sent for ACOE review.
- January 13, 2004: We received comments on Draft BO from ACOE.

Description of the Proposed Action

The Applicant proposes construction of approximately 25 single-family homes on approximately 14.4 acres of a 72-acre site within the Town of Marana, south of the Tortolita Mountains, in Pima County, Arizona. Specifically, the project is located north of the intersection of Moore Road and Quail Run within the west ½ of the southwest ¼ of Section 26, T11S, R12E, Gila and Salt River Baseline and Meridian. The site is accessible from Dove Mountain Boulevard via Moore Road. The project is planned for Pima County Assessor's Parcel Numbers (going clockwise from the southwest lot): 218-44-0640, 218-44-0630, 218-44-0600, 218-44-0590, 218-44-0570, 218-44-061A, 218-44-061B, 218-44-062A, 218-44-062B, and 218-44-0660. The entire site is zoned low-density single-family residence housing (approximately 2.5 acres per lot).

Construction of the project requires clearing and grading of land for house pads, roads and other infrastructure, and deposition of fill material into approximately 0.26 acre of jurisdictional washes.

To avoid impacts to threatened and endangered species and jurisdictional washes, the Applicant has incorporated a number of design constraints. In accordance with our recommendations presented during a technical assistance meeting held on October 22, 2002, development will be limited to 20 % (14.4 acres) of the project. The remaining 80% (57.6 acres) will be managed as open space. This limit on disturbance will protect potential habitat for the endangered pygmy-owl and the lesser long-nosed bat. Of the 14.4 acres of disturbance, only 0.26 acre will occur within jurisdictional waters of the United States. The infrastructure (water lines, power lines, telephone lines, and cable television wires) will be laid within the roadways to minimize the impact to potential pygmy-owl habitat. The washes will be left untouched except for the roads crossing them.

The Applicant will initially clear development areas according to an approved site plan, abiding by the design measures listed in Table 1. The Applicant may at any time before, during, or after construction, form a non-profit Arizona Corporation to act as a Homeowner's Association ("HOA") for the planned subdivision by preparing and filing Articles of Incorporation and other initial corporate documents as may be reasonably required, with the Arizona Corporation Commission. The Applicant will prepare a master set of covenants, conditions, and restrictions ("CC & R's") incorporating appropriate design measures. The CC&R's will be recorded at the Pima County Recorder's Office and become legally binding upon all lot owners and their successors within the subdivision. The Applicant, or HOA if so delegated, will provide an annual report to the us that will include documentation of compliance with conservation elements of the CC&R's.

Prior to commencement of grading within the proposed project site, the Applicant will keep pygmy-owl surveys current in accordance with the USFWS pygmy-owl survey protocol. Year 2002 and 2003 pygmy-owl surveys have been completed with no detections of pygmy-owls.

Table 1. Project Design Measures

1. Design project with total site disturbance of 20 % (14.4 acres) or less. This includes all grading and vegetation clearing.
2. Manage at least 80% (57.6 acres) of project site as conservation areas (natural, undisturbed open space) through CC&R's.
3. Manage the conservation areas within the parcel in a manner conducive to the pygmy-owl by limiting, in perpetuity, those activities that might adversely affect the pygmy-owl. Activities that are not conducive to the conservation of the pygmy-owl include off-road vehicle use, application of herbicides and insecticides, disturbance of vegetation, large groups of people, etc.
4. Preserve habitat connectivity within the parcel and to adjacent suitable habitat by maintaining the washes in a natural state, except at crossings.
5. Establish conservation measures to minimize noise and vegetation disturbance within the project parcels.
6. Identify the maximum allowable size areas disturbed within each lot in respect to grading and vegetation clearing for the building site, utilities, driveways, and other landscape features.

Table 1. Project Design Measures
7. Place utility lines within the roadways to minimize overall project surface disturbance.
8. Utilize t-post fencing or its equivalent to protect and to preserve individual trees, shrubs, and cacti where practical within cleared areas to minimize surface disturbance within the project area.
9. Prior to the initiation of utility and road construction activities, have t-post fencing or its equivalent placed at the clearing limits; keep the fence in place until all road construction and utility construction activities are completed.
10. Prior to the initiation of any clearing activities within each lot, indicate the corners of the clearing limits within each lot with survey pins or other permanent markers. Monitor vegetative clearing activities.
11. Incorporate landscape restrictions into CC&Rs.
12. Utilize traditional xeriscape planting zones where feasible during individual lot landscaping.
13. Incorporate low-intensity lighting constraints into roadway, landscape, and home security design plans. Restrict lighting to building envelopes and roadways, such that open space remains natural, to the extent feasible, consistent with safety concerns.
14. Preclude outdoor domestic cats to avoid predation of pygmy-owls and their prey.
15. Avoid use of chain link or woven-wire fencing within the project boundaries.
16. Establish permanent annual biological monitoring protocol. Include photo points and annual reporting to Fish and Wildlife Service (FWS).
17. Take adequate conservation measures to ensure noise disturbances will not cause pygmy-owls to abandon the area and reinitiate consultation with FWS if a pygmy-owl is detected prior to or after a construction phase has been initiated on the project parcels. These measures include the following: If the FWS, ACOE, or Applicant becomes aware of a new pygmy-owl nest or activity center on or within 0.4-mile (600 m) of the project site, they shall immediately notify each of the other agencies or parties. No additional clearing of vegetation will occur within this area until the Federal agency, Applicant, and the FWS conducts a site specific analysis regarding this new information, and the effects of ongoing and proposed activities to the pygmy-owl. The FWS has determined the following activities within the parameters outlined below **will not** affect the pygmy-owl beyond that which we have analyzed in this BO, and construction activities may continue, provided each of these conditions are met: Clearing of vegetation that is suitable pygmy-owl habitat outside of the estimated home range of 280 acres (113 ha) or 0.4-mile (600 m) radius of a pygmy-owl nest or activity center, provided the clearing is in compliance with the approved project description. Construction noise disturbance outside of a 0.25-mile (400 m) radius of a pygmy-owl nest or activity center. New construction noise disturbance of any intensity between a 330 foot (100 m) and 0.25-mile

Table 1. Project Design Measures

(400 m) radius of a pygmy-owl nest or activity center outside of the pygmy-owl breeding season (February 1 - July 31).

Ongoing construction noise disturbance of the same or less intensity of that occurring during the period of time that the territory was being established up to 0.25-mile (400 m) radius of a pygmy-owl nest or activity center at any time during the year.

Activities that do not meet these parameters will require a case-by-case analysis to determine if reinitiation of consultation is necessary. If reinitiation of consultation is necessary, the FWS shall expeditiously consult with the Federal agency and Applicant to resolve any concerns related to the pygmy-owl and to determine what, if any, measures are needed to minimize potential adverse effects to the pygmy-owl.

Implementation of conservation measures is based on the following four zones:

Zone I. 0 to 330 feet (100 m) from the pygmy-owl activity center

- No additional clearing of vegetation will be permitted without authorization from the FWS.
- Construction-related activities may continue on lands that have already been cleared of vegetation provided that they do not exceed the level/intensity of activity that was occurring during the period of time that the territory was established.
- Activities that would be more intense or cause greater levels of noise disturbance than occurring during the period of time that the territory was established cannot proceed without authorization from the FWS.

Zone II. 330 feet (100m) to 0.25-miles (400 m) from the pygmy-owl activity center

- No additional clearing of vegetation will be permitted without authorization from the FWS.
- No restrictions on the nature or type of construction activity (excluding the clearing of vegetation) from August 1st through January 31st of the following calendar year.
- Construction activities during the breeding season (February 1st to July 31st) cannot exceed the levels or intensity of activities that occurred at the time the territory was established.

Zone III. 0.25 to 0.4-miles (400 to 600 m) from the pygmy-owl activity center

- No additional clearing of vegetation will be permitted without authorization from the

Table 1. Project Design Measures
FWS. • No restrictions on the levels or intensity of construction activity (excluding the clearing of vegetation) at any time of the year. **Zone IV. Greater than 0.4-miles (600 m) from the pygmy-owl activity center** • No restrictions – any activity consistent with the project description provided in the BA and this BO is allowed.

Status of the Species/Critical Habitat

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

Species Description

The pygmy-owl is in the order Strigiformes and the family Strigidae. They are small birds of prey, averaging 6.75 inches in length. Males average 2.2 ounces with females slightly larger averaging 2.6 ounces. The pygmy-owl is reddish brown overall, with a cream-colored belly streaked with reddish brown. The crown is lightly streaked, and a pair of dark brown/black spots outlined in white 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.

The plaintiffs appealed the District Court's ruling on the listing of the pygmy-owl as a distinct population segment. On August 19, 2003, the 9th Circuit Court of Appeals rendered an opinion regarding this appeal which held that, although the FWS did not arbitrarily find the Arizona pygmy-owl population to be discrete, the FWS arbitrarily found the discrete population to be significant. The judgement of the District Court was reversed and the case was remanded to the district court for further proceedings consistent with the 9th Circuit's opinion. Prior to being remanded to the district court, Defenders of Wildlife, intervenors on the original 2001 lawsuit, filed a petition with the 9th Circuit for rehearing, or, in the alternative, rehearing *en banc*. This petition was denied and the matter returned to the District Court, but no ruling has been issued, nor has the right to appeal been forfeited. At this writing, therefore, the pygmy-owl remains listed as endangered, and proposed critical habitat exists.

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 pygmy-owls that are dependant upon continued genetic interchange and population immigration. Two premises were considered in establishing this system: 1) protecting verified pygmy-owl sites and areas with the presence of one or more of the constituent elements within the mean straight-line dispersal distance (8 km (5 mi)) from nest sites and three of the four recovery team-recommended Special Management Areas (SMAs); and 2) providing for the linkage of these verified sites with areas of suitable habitat for which we have adequate scientific information indicating that they are essential to the conservation of the listed population and in need of special management. A complete description of the primary constituent elements of proposed critical habitat and the proposed critical habitat units can be found in the Federal Register announcement of the proposed rule to designate critical habitat for the pygmy-owls (67 FR 71032). 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 and resolution of listing litigation, we will work to finalize the recovery plan.

Life History

Pygmy-owls are considered non-migratory throughout their range. There are winter (November through January) pygmy-owl location records from throughout Arizona (University of Arizona 1995, Tibbitts 1996, Abbate *et al.* 1999, 2000). These winter records suggest that pygmy-owls are found within Arizona throughout the year and do not appear to migrate southward 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 criterion for habitat selection. Historically, pygmy-owls in Arizona used cavities in cottonwood, mesquite, and ash trees, and saguaro cacti for nest sites (Millsap and Johnson 1988). Recent information from Arizona indicates nests were located in cavities in saguaro cacti for all but two of the known nests documented from 1996 to 2002 (Abbate *et al.* 1996, 1999, 2000, AGFD 2003). 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 2003). Therefore, it is important that habitat characteristics within territories and home ranges be maintained over time in order for them to remain suitable. This is important for established pygmy-owl sites, as well as new sites established by dispersing pygmy-owls.

Pygmy-owls are more likely to be affected by projects within their home range because of the species' strong site fidelity. 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 pygmy-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, pers. comm.). Therefore, a 280-acre home range is considered necessary for pygmy-owls to meet their life history requirements on an annual basis.

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. Documented and suspected pygmy-owl predators include great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), screech-owls (*Otus kennicottii*), and domestic cats (*Felis domesticus*) (Abbate *et al.* 2000, AGFD 2003). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999).

AGFD telemetry monitoring in 2002 indicated at least three of the nine young produced that year were killed by predators prior to dispersal during a year when tree species failed to leaf out due to drought conditions (AGFD 2003). 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.

Vegetation communities that provide a diversity of structural layers and plant species likely contribute to the availability of prey for pygmy-owls (Wilcox *et al.* 2000). Pygmy-owls also utilize different groups of prey species on a seasonal basis. For example, lizards, small mammals, and insects are utilized as available during the spring and summer during periods of warm temperatures (Abbate *et al.* 1999). However, during winter months, when low temperatures reduce the activity by these prey groups, pygmy-owls likely turn to birds as their primary source of food and appear to expand their use area in response to reduced prey availability (Proudfoot 1996). Therefore, conservation of the pygmy-owl should include consideration of the habitat needs of prey species, including structural and species diversity and seasonal availability. Pygmy-owl habitat must provide sufficient prey base and cover from which to hunt in an appropriate configuration and proximity to nest and roost sites.

Freestanding water does not appear to be necessary for the survival of pygmy-owls. During many hours of research monitoring, pygmy-owls have never been observed directly drinking water (Abbate *et al.* 1999, AGFD 2003). It is likely that pygmy-owls meet much of their biological water requirements through the prey they consume. However, the presence of water may provide related benefits to pygmy-owls. The availability of water may contribute to improved vegetation structure and diversity, which improves cover availability. The presence of water also likely attracts potential prey species improving prey availability.

Habitat

Pygmy-owls were historically recorded in association with riparian woodlands in central and southern Arizona (Bendire 1892, Gilman 1909, Johnson *et al.* 1987, Johnson *et al*. 2003). Plants present in these riparian communities included cottonwood (*Populus fremontii*), willow (*Salix* spp.), ash (*Fraxinus velutina*), and hackberry (*Celtis* spp.). However, recent records have documented pygmy-owls in a variety of vegetation communities such as riparian woodlands, mesquite (*Prosopis velutina* 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 into 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, not all of this plant community is vegetatively suitable for pygmy-owls. 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, Flesch 2003a). These types of areas are typically located along drainages and wash systems, or in areas with better soil and moisture conditions such as bajadas.

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). Occupied desertscrub communities are characterized by the presence 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 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, or organ pipe cactus large enough to support cavities for nesting, and elevations below 1,200 meters (4,000 feet)) (Swarth 1914, Karalus and Eckert 1974, Monson and Phillips 1981, Johnsgard 1988, Enriquez-Rocha *et al.* 1993, Proudfoot and Johnson 2000). Large

trees provide canopy cover and cavities used for nesting, while the density of mid- and lower-story vegetation provides foraging habitat and protection from predators, and it contributes to the occurrence of prey items (Wilcox *et al.* 2000). Perch substrates used by pygmy-owls for calling are typically the tallest trees available within a home range, though pygmy-owls have also been noted calling from within saguaro cavities (Flesch 2003a).

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

Species Status and Distribution

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 (Hunter 1988, AGFD 1999).

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, 24 in 2002, and, most recently, 21 in 2003 (AGFD 2002a). 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. It is likely 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 - 2003 (Abbate *et al*. 1996, 1999, 2000, AGFD 2002a)

Area	Year	Sites	Adults	Young
Northwest Tucson	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
	2003	4	4	0
Pinal County	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
	2003	0	0	0
Altar Valley	1998	2	4	unknown
	1999	14	18	11
	2000	6	8	4
	2001	11	18	12
	2002	8	10	7
	2003	5	9	16

Organ Pipe Cactus National Monument and Cabeza Prieta National Wildlife Refuge	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
	2003	5	6?	0

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 pygmy-owls among groups of pygmy-owls in southern Arizona and northern Mexico resulting from the connectivity of suitable habitat. The extent to which pygmy-owls disperse across the U.S./Mexico border is unknown, but recent survey work indicates that pygmy-owls regularly occur along the border (Flesch and Steidl 2000, Flesch 2003b). However, addressing habitat connectivity and the movements of pygmy-owls within Arizona is a primary consideration in the analysis of this project due to the importance of maintaining dispersal and movement among pygmy-owl groups within the U.S.

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

The ability and opportunity for pygmy-owls to disperse within population segments, as well as emigrate to adjacent population segments is likely important for the long-term persistence of pygmy-owls in Arizona. Pygmy-owl dispersal patterns are just beginning to be documented. 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 2002b). 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 2003).

Reasons For Listing

In determining whether listing of the pygmy-owl was warranted, we were required under section 4(a)(1) of the Act to consider five listing factors: a) the present or threatened destruction, modification, or curtailment of its habitat or range; b) overutilization for commercial, recreational, scientific, or educational purposes; c) disease or predation; d) the inadequacy of existing regulatory mechanisms; or e) other natural or manmade factors affecting its continued existence. We determined 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 affects the pygmy-owl (Abbate *et al.* 1999).

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 Act, 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 (CWA), 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.

Recent genetic research suggests that pygmy-owls in the action area show evidence of genetic separation from other populations in Arizona and Mexico (Proudfoot and Slack 2001). They have found that the low level of genetic variation and the absence of shared haplotypes between pygmy-owls in northwestern Tucson and the remainder of the State and Mexico increases the potential for the natural divergence of this population from the rest of the pygmy-owl population in Arizona. 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.

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.

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. 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 (AGFD pers. comm.).

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). 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).

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 pers. comm.). 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 affect 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 pygmy-owls increase (Banks 1979, Klem 1979, Churcher and Lawton 1987). This may be particularly important in the Tucson area where pygmy-owls are located in proximity to urban development. 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 pygmy-owl was found dead at a wire fence; apparently it flew into the fence and died (Abbate *et al.* 1999). 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 pygmy-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 2003). 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, Johnson *et al*. 2003).

Johnson *et al*. (2003) hypothesized that large-scale water development (damming and diversion of the Salt and Verde rivers) led to initial declines in species abundance and distribution.

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. Currently, within the action area for this project, there are only three pygmy-owl sites that are known to be active, and all three are unpaired males. The immigration of one or more female pygmy-owls into this area is essential to maintaining this group of pygmy-owls and their contribution to the overall survival and recovery of the pygmy-owl in Arizona.

Information about populations of pygmy-owls in Mexico is limited. Based on personal observations and anecdotal information, Russell and Monson (1998) recorded no decline in numbers from Sonora, Mexico. However, the first systematic surveys for pygmy-owls in Sonora were conducted in 2000 and 2001. These surveys resulted in the detection of 524 pygmy-owls along 329 transects, covering 1,113 km (Flesch and Steidl 2000, Flesch 2003b). Pygmy-owls were detected throughout the state of Sonora, from the international border south to the Sonora/Sinaloa border. In 2000 and 2003, AGFD personnel documented, through the use of radio telemetry, the movement of two dispersing juvenile pygmy-owls into Mexico from nests just north of the international border (AGFD pers. comm.). However, while movement of pygmy-owls across the border likely occurs, we have 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. In Mexico, millions of acres of Sonoran Desert and thornscrub are being converted to buffelgrass (*Pennisetum ciliaris*) which represents both a direct and an indirect loss of habitat because of invasion into adjacent areas and increased fire frequency and intensity (McLaughlin and Bowers 1982, Burquez-Montijo et al. 2002). Burquez and Yrizar (1997) state that "Given the government subsidies to establish exotic introduced grasslands, to maintain large cattle herds, and to support marginal cattle ranching, the desert and thornscrub in Sonora will probably be replaced in the near term by ecosystems with significantly lower species diversity and reduced structural complexity, unless control measures are implemented." Such replacement is and will continue to affect pygmy-owl prey base and habitat availability. In the not-so-distant future, pygmy-owls in Arizona may represent the majority of pygmy-owls occupying the Sonoran Desertscrub and Semi-desert Grasslands.

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 levels of threat 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, approximately 159 Federal agency actions have undergone informal consultation regarding the potential effects to pygmy-owls. These are actions that included sufficient measures to avoid or minimize impacts to the pygmy-owls so that the effects were insignificant or discountable. At least 46 Federal agency actions have undergone formal section 7 consultation throughout the pygmy-owl's range. Of these, only one resulted in a draft jeopardy opinion, and that was resolved as a non-jeopardy final opinion. Six formal consultations anticipated incidental take of one or more pygmy-owls. However, only "take" in the form of harassment was authorized. Given the extremely low number of known pygmy-owls in Arizona, lethal "take" of even a single owl would make it difficult to avoid jeopardizing the species. 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.). Since 1997, we have provided technical assistance to hundreds of projects that did not have a federal nexus, primarily single-family residences. These actions have no legal requirement to follow the recommendations we provide under technical assistance, and we have no way of monitoring if or to what extent the recommendations are incorporated. They may or may not contribute to the conservation of the pygmy-owl, but they certainly contribute to ongoing effects to pygmy-owl habitat. Stochastic events, such as fire, drought, and predator population status, 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 has resulted in biological opinions that have also led to acquisition of otherwise unprotected property specifically for conservation of the pygmy-owl.

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 defined the action area as the project site plus a 21-mile buffer area defined by the maximum documented dispersal distance for juvenile pygmy-owls. This is consistent with our prior determinations of an action area based the maximum straight-line distance traveled from natal areas for juvenile pygmy-owls in Arizona (AGFD 2002b). Based on this information, we continue to believe that these are important considerations in analyzing the effects of this project on the status of the species, but we do not believe these analyses are appropriately conducted on the action area-level. We now determine the action area based on the extent of the indirect

effects resulting from the proposed action. The revised action area determination thus includes: (1) the area affected by increased traffic and other urban effects; (2) increased predation from subsidized predators and household pets, domestic cats in particular; and (3) incremental, adverse changes to the geomorphology of the Tortolita Fan.

The presence of transportation infrastructure (i.e. roads) often degrades and fragments habitat, and given that such infrastructure is typically part of a network or system, the effects are often synergistic and widespread (Seiler 2001). Where such features are already present, the initial adverse effects of new residential development are the result of increased use of that infrastructure. Roads present a mortality hazard to pygmy-owls. While narrower roads or wider roads with medians that incorporate trees can minimize the risk of mortality, it cannot be eliminated. Further, the risk of vehicle-strike mortality is likely related to the number of vehicles using the road; a greater number of vehicles (or a greater frequency of use) can reasonably be expected to increase the probability that a pygmy-owl will be struck. Given the pygmy-owl's rarity and patchy distribution, any vehicle strike mortality could have serious adverse consequences to a regional subpopulation. As the population and number of vehicles increases in an area, existing roads are often widened to accommodate the increase. Wider roads result in an increased distance of open area without vegetation or cover across which pygmy-owls must fly. Behaviorally, pygmy-owls are reluctant to cross wide, open areas and wide roadways may represent an impediment to pygmy-owl movements.

The action area can be partially defined by the portion of the existing transportation network likely to be affected by the construction of the Estates at Tortolita Preserve subdivision. The project area is largely rural, with a patchy distribution of residential and commercial developments of varying densities. The Estates at Tortolita Preserve subdivision will include no commercial or retail development, so it is likely that an appreciable portion, if not all, of the residents will travel by car to work, regional shopping centers, schools, etc.

As discussed above, it is also reasonable to assume that incremental increases in traffic volume will eventually necessitate the improvement of existing arterial roads. Such improvements are likely to include widening to accommodate additional traffic, left-turn lanes, wider shoulders, etc. Local governing bodies, including Pima County and the towns of Marana and Oro Valley, assess "impact fees" on new development; roads are included in these surcharges. Marana raises a large proportion of its money for roads from a 2% tax on new-home construction (The Arizona Daily Star 2003), and Oro Valley recently increased its roadway development impact fee to increase the capacity of the town's roadways system (The Northwest Explorer 2003), thus indicating that road construction and/or improvements are indirect, interdependent effects of that construction. As such, the action area must thus include all pygmy-owl territories and dispersal corridors intersected by those roads that are likely to be affected by the incremental increases in vehicular traffic from the Estates at Tortolita Preserve subdivision. The extent of those effects may be defined by evaluating average trip distance. The Bureau of Transportation Statistics (2003) determined the average daily mileage of person-trips in personal vehicles to be approximately 10 miles. We thus apply this average distance to the major arterial streets serving the proposed Estates at Tortolita Preserve subdivision, including Moore Road, Dove Mountain Boulevard, Tangerine Road, El Camino de Mañana, Thornydale Road, and Cortaro Farms Road. Further, there is reasonable certainty that an interchange will be constructed to connect the Linda

Vista Boulevard/El Camino de Mañana junction to Interstate 10, and the contribution of impact fees from the proposed project to road projects in Marana renders that road reasonably certain to eventually be subjected to increased traffic volume from the Estates at Tortolita Preserve subdivision.

Within 10 miles of the project, these arterial routes cross the 600-meter radii of four pygmy-owl home ranges. These routes also cross the 5-mile average pygmy-owl dispersal distance from an additional 11 home ranges not directly intersected as described above. This necessitates that we evaluate the project's effects to 15 pygmy-owl home ranges and breeding and dispersal habitat adjacent to the affected roadways within 10 miles of the project site. While not all of these home ranges are currently occupied, research monitoring has shown that vacant pygmy-owl home ranges are sometimes re-occupied over time (AGFD 2003).

The action area may be further defined by the area that could be affected by subsidized predators, such as household cats. The scope of this effect is related primarily to the home-range size of the predator. While home range data exist for a variety of predators, the effects of potentially increased prey bases near irrigated urban areas confounds the determination. House cats, however, have been studied in wildland/urban interfaces. Goltz *et al*. (2001) studied feral cat predation of passerine birds in dry, high altitude areas in Hawaii National Park and determined that home ranges of male cats ranged from 10 to 95 square kilometers (2,471 to 23,475 acres). The authors also noted that two of the male cats tracked roamed up to 25 kilometers (15.5 miles) between sites. Edwards *et al*. (2001) studied male feral cats in a semiarid woodland in central Australia and noted long-term mean home ranges as large as 2,210.5 hectares (5,462 acres), 24-hour mean home ranges of 249.7 hectares (617 acres), and movements of up to 34 kilometers (21.1 miles). While these numbers are compelling, they represent movement of feral cats in relatively wild lands; home ranges of house cats are more applicable to this analysis. Regardless, it should be noted that feral cats originate as escaped pet house cats or are their progeny.

Barratt (1995) conducted *house* cat home range and predation studies in Canberra, Australia in a system of suburbs interspersed within remnant grassland, woodland, and open-forest habitats and found that the largest day-time home range among the four cats who entered the woodlands was 17 hectares (42 acres), the largest night range was 28 ha (69 acres), and the furthest distance moved into adjoining habitat was 900 meters (0.6 mile). This sort of widely-ranging house cat must be considered a potential predator on the pygmy-owl. Moreover, the animals taken by the cats (small mammals, birds, and reptiles) overlap with the prey base of the pygmy-owl, indicating that interspecific competition for prey could occur. We thus consider the action area defined by the effects of pets (house cats) to include the project site and not less than a 900-meter (0.6 mile, or 2953 feet) buffer around it. This 900-meter buffer accounts for approximately 1,015 acres of indirect effects, and overlaps a pygmy-owl home range to the east, as well as known dispersal routes adjacent to the project.

A third category of indirect effects influences the action area for the Estates at Tortolita Preserve subdivision and is related to incremental changes in surface hydrology across the Tortolita Fan. Alluvial Fans are depositional landforms, developed over geologic time, at the base of mountain ranges where ephemeral streams emerge from the higher gradient channels of the highlands to a

markedly lower-gradient valley floor (Hydrologic Engineering Center 1993, Smith 2000). The "fan" terminology arises from the radial shape of the channels and depositional features on the plain. The lowlands surrounding the Tortolita Mountains also exhibit characteristics of alluvial slopes, which are differentiated from fans in that the channels are largely parallel, rather than radiating from the toe of the mountain front.

Rosgen's (1994) hierarchical stream classification system places alluvial fans under the "D" stream type. Rosgen's D-type streams are characterized by the presence of multiple, braided or bar-braided patterns with high channel width-depth ratios and channel slopes generally equivalent to the attendant valley slope. Bank erosion rates are characteristically high and meander-width ratios (the degree of lateral movement; sinuosity) low. The D-type stream system in the Tortolita Fan is typical of arid-region systems in which the flashy (highly variable, spate-driven) runoff regime generates a high-sediment supply. Indeed, the Tortolita Fan classifies as D-5 stream type, which indicates a sand-dominated system.

We have noted that the Tortolita Fan appears to exhibit a relatively high-gradient landform slope mimicked closely by the attendant channel gradients; the channel-bottom slopes are essentially equal to the slope of the downhill slope of the surrounding uplands. This characteristic, as well as the inverse relationship between sinuosity (meandering) and channel gradient (slope), would indicate that the baseline state of unaffected Tortolita Fan channels is one of relatively straight channels with high lateral stability. We further hypothesize that lateral movement of channels occurs at very slow rates on the Tortolita Fan, as evidenced by the widespread presence of mature examples of slow-growing plants such as ironwood trees and saguaro cactus in close proximity to active channels.

Rosgen (1994) also states that adjustments in channel patterns on D-type streams can be initiated by changes in the encompassing landform, contributing watershed area, and/or the existing channel system. While the landform of the Tortolita Fan remains relatively intact and unconstrained at the regional scale, each of these perturbations have already occurred to varying degrees.

Alterations have been made to the smaller-scale landform through the placement of roads and the construction of structures. Arterial roads in particular intersect numerous channels, and deposition of sediments upon fords (low-water crossings) following runoff events is evidence of the sediment-producing (and depositing) capacity of the system. Roads and bridges can alter a given channel's morphology by imposing on it a "hard" cross section that may differ from the natural cross section existing above the road (Rosgen pers.comm). The changed cross-sectional geometry that flowing water encounters at low-water crossings and at bridges is often results in small-scale channel adjustments that include elevated mid-channel deposition within the road and subsequent lateral scour of xeroriparian vegetation within the reach immediately downstream of the crossing.

A second, small-scale landform-type effect already widespread on the Tortolita Fan is the construction of homes on the land bases between channels. These interfluvial areas were formed by the long-term deposition of sediments by channels and are thus properly viewed as depositional features. During periods of precipitation, however, these interfluves can be

expected to contribute runoff and, to a lesser degree, sediment, to the adjacent channels. The development of appreciable portions of the land between the Tortolita Fan's various channels has changed runoff and sediment-contribution and thus has likely contributed to geomorphic adjustments.

There have also been changes in the contributing watershed area of the Tortolita Fan. The Dove Mountain development, constructed at the base of the Tortolita Mountains, includes retention basins, lined channels, large golf courses, and an appreciable amount of impervious area. This development has not changed the watershed in terms of its areal extent, but it is likely to have altered the behavior of flowing water in the location where perturbations are likely to have the greatest adverse hydrologic effect: the fan's apex. Stream flow exerts a strong influence on channel morphology (Rosgen 1994). It is therefore likely that there has at least been some alteration in the magnitude, frequency, duration, and/or sediment load of peak flow events originating above the constructed area, though the linkage between those changes and effects on the ecosystem containing the pygmy-owl cannot yet be measured.

Of the most immediate concern are developments that directly alter the existing channel system via encroachment or channelization. Encroachment on the channel sufficient to trigger geomorphic adjustments is rare due to application of local floodplain development regulations, though it must be understood that the traditional 100-year floodplain restrictions may allow development in close proximity to steeper channels with limited floodplain development. These proximal developments, while theoretically outside of the floodplain, may still have the capability of altering channel morphology during periods of elevated discharge. The Hartman Vistas development just east of Interstate 10 along Linda Vista Boulevard included homes and lots that encroach on the xeroriparian system, though we are presently unsure if adjustments in channel geometry have developed or will in the future. We have also observed the conversion of formerly-natural channels to trapezoidal, concrete-lined or banked floodways in association with the Dove Mountain/Heritage Highlands development, as well as elsewhere in lower reaches of the Tortolita Fan.

Rosgen's (1994) treatment of fluvial systems thus informs us that alluvial fans are depositional in nature and exist in a state of dynamic equilibrium between sediment supply and surface water runoff. Changes in the flow and/or sediment supply to or within an alluvial fan can affect the fan's downstream surface. Past development has contributed to baseline levels of adverse effects, but we are becoming increasingly concerned with future project's alterations to sediment supply and the timing, magnitude, and frequency of peak flows.

While further changes to the Tortolita Fan's apex (or within the mountain/lowland transition of an alluvial slope) are expected to have the greatest effect, any retention of sediment can affect the sediment transport capacity, or competence, of the flow across the fan (Hydrologic Engineering Center 1992). When competence of the flow exceeds the sediment load available, channel incision and/or widening are likely to occur (Hydrologic Engineering Center 1992). The Tortolita Fan is vulnerable to fluvial readjustment because the decomposed, granitic soils are susceptible to erosion. The erosive nature of the fan likely receives little mitigative effect from the Sonoran desertscrub vegetation, which does not possess the highly rhizominous structure (complex rooting patterns) or density to account for an appreciable level of bank stability. We

feel its is more likely that lateral movement is presently restricted by the steep gradients and minimal sinuosity evident in channels on the Tortolita Fan.

Further lateral erosion (meandering, undercutting, mass wasting of banks) within the channels on the Tortolita Fan processes may erode, flank, scour, and ultimately remove xeroriparian vegetation within and adjacent to channels. Vertical erosion (downcutting, headcutting, gully-forming) can reduce alluvial ground water availability via incision of water tables and result in indirect stresses on plants. The latter process is less likely on the Tortolita Fan, as channel slope is already nearly equivalent to the valley slope.

If erosion within the Tortolita Fan's channels advances to the point where existing developments and infrastructure are threatened, or if hydraulic modeling anticipates appreciable future erosion will occur, the placement of structural flood control measures such as bank protection (to arrest the more-likely lateral migration scenario) or gradient-control structures (to mitigate the less-likely vertical erosion scenario) may be indicated. The worst-case scenario, from an ecological standpoint, would be wholesale channelization. Each of these flood damage reduction schemes is likely to have appreciable impacts on the xeroriparian ecosystem. The existing and future incremental development of the Tortolita Fan may thus precipitate landscape-scale vegetative changes to the fan that are adverse to pygmy-owls.

The portion of the aforementioned, potential, landscape-scale effects directly attributable to the proposed Estates at Tortolita Preserve subdivision would likely manifest in the channels from the project area downstream to the Santa Cruz River. These channels intersect the potential dispersal routes from at least three pygmy-owl home ranges and thus, influence conservation of the pygmy-owl well beyond the footprint of this project. This is significant due to the fact that washes and drainages provide vegetation characteristics utilized by breeding and dispersing pygmy-owls within the entirety of CHU 3.

The action area for the Estates at Tortolita Preserve is thus defined by the direct and indirect effects resulting from this project including the effects of house cats (900 meter radius), increased traffic and road effects (10 mile mean trip distance), and fluvial effects (drainages and associated vegetation downstream to the Santa Cruz River). These effects influence the viability of proposed Critical Habitat Unit 3 (CHU 3). The effects to this critical habitat unit are key in our evaluation of whether this project will result in the appreciable reduction in the survival and recovery of the species or adversely modify proposed critical habitat. The action area contains portions of three pygmy-owl home ranges and intersects dispersal habitat and known dispersal pathways for an additional 12 pygmy-owl home ranges. Critical habitat was proposed based on pygmy-owl occupancy status and/or the area's contribution to habitat connectivity and habitat availability needed for population expansion. Effects on the past and current function of these areas have occurred as a result of capital improvement projects, residential and commercial development, and agricultural activities. 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. Remaining areas of pygmy-owl habitat within the action area are very important. The following discussion further elaborates past and ongoing effects 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 the past three years, we completed 13 formal section 7 consultations and 69 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 our input. 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 Estates at Tortolita Preserve Project.

Dove Mountain and Heritage Highlands, together covering close to 5,600 acres, are mixed-use developments located in close proximity to the north and east of the project parcel. Consultation was conducted for a portion of Dove Mountain and a portion of Heritage Highlands, and actions are being implemented to reduce effects on pygmy-owls. However, approximately 97 acres of the Heritage Highlands project has been or is being graded and developed without undergoing section 7 consultation. The Section 36 development is situated immediately adjacent and southeast of the project site and construction has begun on up to 172 acres of the 598 acres of habitat in the project site. These residential, commercial, and golf developments have removed hundreds of areas of habitat and contribute to habitat fragmentation but have also set aside habitat areas that are suitable for dispersal and breeding. Another development proposal, Sky Ranch, has recently been issued a section 10 permit and developed a Habitat Conservation Plan (HCP) covering over 500 acres of pygmy-owl habitat just to the southeast of this project. While this development is being planned to reduce effects on pygmy-owls, the clustered development will result in both further fragmentation of the landscape and permanent conservation of certain nesting, foraging, and dispersal habitat.

In July 2000, we completed a consultation with the EPA for a 20-acre residential development (Countryside Vistas Blocks 5 and 6) approximately 4 miles to the south. In December 2000, we completed a consultation with the EPA for a 29-acre residential development (Tecolote de Oro) approximately 4.5 miles to the southeast. In July 2001, we completed a consultation on the 7-acre Crescent Ridge Apartments, approximately 4 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 4 miles to the southeast, and a 141-acre residential development (Hartman Vistas), approximately 4 miles to the south. In February 2002, we completed a consultation with the EPA on improvements to Thornydale Road that removed 9 acres of suitable habitat approximately 5 miles to the south. In April 2002, we completed consultation with the EPA on a 150-acre residential and commercial development (Chaparral Heights) approximately 4 miles to the southeast of the project site. In July 2003, we completed consultation on the development of Section 36 in Township 11 North, Range 12 east, in Marana, one mile southeast of the proposed project. In March 2002, we completed consultation with the Environmental Protection Agency (EPA) on a 100-acre residential development (Butterfly Mountain) adjacent to the project on the

east. Butterfly Mountain will result in approximately 17% surface disturbance, but will retain potentially suitable nesting, foraging, and dispersal habitat.

While none of the above actions rose to the level of jeopardy, “take” of one or more pygmy-owls was anticipated on four of the above projects. Additionally, the two existing HCPs within the vicinity of this project also authorize non-lethal "take" of pygmy-owls. Previously authorized "take" of pygmy-owls in the action area results in an analysis framed by a potentially diminished pygmy-owl population baseline. It is clear that portions of the action area for this project are experiencing ongoing loss and fragmentation of habitat that may affect the pygmy-owl in northwest Tucson. This trend is expected to continue. Some of these activities have had a Federal nexus that resulted in section 7 consultation. As a result, we have 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. 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.

As described above, portions of the action area are reasonably certain to continue to experience effects 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. Trends in urbanization and development within the action area are further described in more detail within the Cumulative Effects section of this BO.

The Estates at Tortolita Preserve subdivision is situated south and east of a contiguous block of several thousand acres of State Trust, including approximately 2,400 acres leased for pygmy-owl conservation purposes as part of the Dove Mountain development project. The portion of the action area defined by the effects of increased traffic on Tangerine Road and El Camino de Mañana lies adjacent to or within these State lands. 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 effects to 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 concentrations of pygmy-owls, particularly nesting pygmy-owls, that are important sources of young pygmy-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 pygmy-owls where juvenile pygmy-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.

In 2003, only a small population (three adults) of pygmy-owls were known in the action area. Of the known pygmy-owls, all are males, increasing the vulnerability of this population segment to extirpation. This emphasizes the need to facilitate immigration of pygmy-owls into the action area to breed and disperse, particularly to enhance the pairing of known single males. Pygmy-owl use in the vicinity of this project has been documented since 1994. In 1994, a pair of pygmy-owls was located within 1.5 mile of the project, although no nest was confirmed. In 1995 and 1996, an unpaired pygmy-owl was detected within 1.5 mile of the project. In 1998, a nest was located within 2 miles and two dispersing juveniles established a breeding territory approximately 1/4 mile to the east. This pair successfully produced young in both 1999 and 2000. Two additional pygmy-owl territories have been documented within five miles of the project since 2000. In 2002, there were two occupied pygmy-owl territories within four miles of the project. In 2003, these same two territories continued to be occupied.

In addition to territorial pygmy-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 adjacent to the project. In 1999 and 2000, dispersing juveniles from the adjacent nest site may have crossed the project parcel as they moved north and west, based on consecutive telemetry locations. A dispersing juvenile was documented moving west along the south side of Tangerine Road, within 1 mile of the project, during the fall of 2001. This same pygmy-owl crossed Tangerine Road and moved north within 0.25 mile of the project's east boundary.

From 1999 to 2002, CHU 3, including the action area, has accounted for approximately 30% of the documented adult pygmy-owls and 40% of the documented nests in Arizona (Abbate *et al.* 1999, 2000, AGFD 2002a). Given the substantial proportion of the statewide documented pygmy-owl population that this represents, we believe the pygmy-owl habitat and dispersal corridors found within the action area are important for the survival and recovery of the pygmy-owl statewide.

Effects of the Proposed Action

The residential housing portion of the proposed action will result in the net, permanent loss of 14.4 acres (20% of the 72-acre project site) 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 support nesting or territorial pygmy-owls. This project will also increase habitat fragmentation within the project site. The entire project site contains suitable habitat for the pygmy-owl, and it could provide for each of its life history components. The project site is

near existing and proposed urban development. The access road will result in the introduction of new vehicle strike hazards and hydrologic changes within the fluvial features it crosses.

The action area intersects or lies within the Northwest Tucson SMA 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 pygmy-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 20% of the residential project area.

Surveys for pygmy-owls were conducted on the project in 2001, 2002, and 2003. No pygmy-owls were detected during these survey efforts. However, as described in the Environmental Baseline, this project falls within a pygmy-owl home range and a number of others are located within a few miles. None of the proposed project activities will occur within the known, active home ranges within the action area. Therefore, we do not believe that this project will directly affect a known breeding site for the pygmy-owl. However, given the history of occupancy and dispersal in the project vicinity, there is the likelihood that a pygmy-owl may reoccupy or establish a territory on or adjacent to the project site. If a pygmy-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 described in Table 1, 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. Should these measures be needed, we must be contacted, and the need to reinitiate formal consultation will be assessed. There is a reasonable likelihood that juvenile pygmy-owls will disperse through or onto the project site during construction of this development because: (1) there have been active nest sites within the mean dispersal distance of this project; (2) the project site contains and will retain suitable dispersal corridors; and (3) dispersal has been documented in the immediate vicinity of the proposed project site. 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 dispersed residential development associated with this project will affect the configuration of dispersal habitat compared to existing conditions, but these effects 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 pygmy-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 pygmy-owls to the survey protocol, the likelihood that AGFD will not monitor all pygmy-owls in northwest Tucson with telemetry, and the difficulty in defining owl use areas, we anticipate the possibility that a pygmy-owl could establish a territory on or adjacent to the project without being immediately detected.

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, Wilcox *et al.* 2000). 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.

To support the movement of pygmy-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, conserved open space has been incorporated into the project description. This conserved open space will provide approximately 57 acres of habitat throughout the project area and protected dispersal corridors through the project area. It is reasonable to assume that pygmy-owls will be able to utilize these corridors to move through the project site, though the positioning of houses on the interfluve areas between the channels may render the habitat less suitable and/or reduce movement perpendicular to the washes within the residential area.

There are also 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 and glass windows, 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 pygmy-owl mortality there (Cartron *et al*. 2000b). 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 effects on pygmy-owls.

Roads present a mortality hazard to foraging and dispersing pygmy-owls. The tree-to-tree flight pattern of the pygmy-owl can be disrupted by roads; the road's width may prevent the pygmy-owl from crossing or pygmy-owls that do cross may be struck by passing automobiles. While connectivity is improved by retaining roads in a narrow state or incorporating vegetated medians into a wider road, the risk of vehicle mortality can never be eliminated. The project can reasonably be expected to generate a greater number of vehicle trips per day than currently occurs in the action area. This increase in vehicle trips (or a greater frequency of use) can therefore reasonably be expected to increase the probability that a pygmy-owl will be struck. Given the pygmy-owl's rarity and patchy distribution, and the fact that Tangerine, Camino de

Mañana, Thornydale, and other major roadways in the action area cross documented pygmy-owl dispersal routes, any vehicle-strike mortality could have serious adverse consequences for the long-term persistence of pygmy-owls in northwest Tucson because there are only three known individuals at this time.

Barratt (1995) studied the home range and predation of house cats within a mosaic of suburban and remnant grassland, woodland, and open-forest habitats in Canberra, Australia. Of the 17 cats selected for radio collaring and telemetry work, 10 were house cats (the remainder were feral). It was found that 4 of the 10 house cats entered the woodlands. The home range sizes associated with these cats were discussed in the Environmental Baseline section, above. Barratt (1995) also studied the prey items caught by a larger sample (214) of house cats for a 12-month period. Some 2,000 vertebrate prey items were documented, representing at least 67 species. House mice comprised 56% of the total, black rats 7%. Forty-seven species of birds (41 of which were native species), comprised 27% of the total catch. Reptiles represented 7% of the total, and amphibians 1%.

The results of Barratt's prey study inform two analyses for adverse effects on the pygmy-owl. House cats represent a direct threat to pygmy-owls. Pygmy-owl's small size is typical of many passerine birds, and they are within the size range of birds that may be taken by a house cat. It has been specifically documented in Texas that free-roaming cats have killed both adult and fledgling pygmy-owls. In northwest Tucson, two incidences of likely cat predation have been documented (AGFD 2003). Given the heavy representation of small rodents, birds, and reptiles noted by Barratt's study and the similar cross section of pygmy-owl prey recorded by Abbate *et al.* (1999), we are concerned that house cats may actually compete for prey with the pygmy-owl. The substantial overlap in prey preference may secondarily expose the pygmy-owl to increased risk of predation (i.e both animals are seeking the same prey), particularly in those moments when the pygmy-owl has seized a prey item larger than itself on the ground.

The Applicant will specifically establishe CC&Rs related to domestic cats. This CC&R states that lot owners will be required to contain all domestic cats indoors. We have determined that this will appreciably minimize the risk of pygmy-owl mortality from house cats, though it will not eliminate it.

Surficial hydrology within and downstream of the project area is an indirect effect of the proposed action, and its effects are described in detail in the Environmental Baseline portion of this opinion. While the effects of these hydrologic and fluvial changes on the pygmy-owl are difficult to measure, they are of increasing concern to us because they may contribute to landscape-scale, adverse changes to fluvial and interfluve areas on the Tortolita Fan. This project will essentially leave all drainages intact, which should substantially reduce hydrological impacts.

An increased incidence of environmental contaminants is an indirect effect of the proposed action. The use of pesticides, in particular, 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 prohibited in the conserved open space, helping to reduce, but not eliminate, effects in these areas.

The effects that non-directional and high-intensity lighting has on pygmy-owls are unknown. In residential areas, lighting is expected to increase; 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 pygmy-owl sites. The BA indicates that low-intensity and directional lighting will be used to reduce the exposure of pygmy-owls to predation in these areas. Thus, adverse effects would be substantially reduced or eliminated.

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 a pygmy-owl were present, it is possible that such noise disturbance would affect the pygmy-owl directly by altering behavior and, indirectly, through potential increases in predation, effects on prey species, etc. However, these effects 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 pygmy-owls on and adjacent to the project. This should reduce the effects on pygmy-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 conserved 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 conserved open space corridors, the corridors should provide connectivity and cover for pygmy-owls and allow for movement through the project site, reducing the effects 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. The proposed Estates at Tortolita Preserve subdivision will make incremental contributions to increased traffic. The roadway impact fees collected from the development will be used to improve existing roads and construct new ones in the project's region. These future actions are interrelated to the proposed action. The effects of these interrelated activities have already been considered in our analysis under Effects of the Proposed Action. We are unaware of any other interrelated or interdependent actions associated with this project.

Critical Habitat

The project area falls within the 73,958-acre Unit 3 of proposed critical habitat for the pygmy-owl (U.S. Fish and Wildlife Service 2002). All of the primary constituent elements 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 14.4 acres within the project boundaries. This equals approximately 0.02% of the gross acreage within CHU 3. However, the actual percentage of critical habitat removed is somewhat higher since only a portion of the areas contain primary constituent elements and are therefore considered critical habitat. (U.S. Fish and Wildlife Service 2002).

Regardless of the quantity of habitat to be altered, the location of this project and the associated habitat impacts are consequential because of the proximity to known breeding and dispersal sites. The FWS Section 7 Consultation Handbook defines the destruction or adverse modification of critical habitat as "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical." Based on the minimization and mitigation measures included in the BA and this BO, we do not believe effects to critical habitat rise to the level of destruction or adverse modification. Movement corridors will be maintained through the project site to allow for the movement of pygmy-owls through the area and the conserved open space should allow for continued use of the breeding territory. The conservation measures described above and in the BA should maintain the function and viability of proposed CHU 3. In addition, these measures are also in conformance with the recovery objectives outlined in the draft pygmy-owl recovery plan, and would not, therefore, appreciably reduce the likelihood of recovery of the pygmy-owl.

Summary

Based on the current status of the pygmy-owl in Arizona, its survival and recovery will likely require not only protection of all known sites, but also the conservation of other areas not currently known to have nesting pygmy-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 pygmy-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 pygmy-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 pygmy-owls and nests in Arizona. They also contain habitats not currently known to have nesting pygmy-owls that are likely important for the expansion of the population. 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.

The development of the Estates at Tortolita Preserve subdivision will permanently remove approximately 14.4 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 20% of the project site will have vegetation removed or disturbed, with approximately 80% 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 effects on 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 the BA and this BO; 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 effects on the Arizona pygmy-owl population.

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 Act. As defined in the Environmental Baseline section, above, the action area for this project is defined using effects from roads, cats, and impacts to hydrology. The action area thus overlaps or adjoins areas 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. It must also be noted that avoidance of jurisdictional waters, including bridging over or jack-and-boring under them, may preclude the need obtain a 404 permit, thus removing a given project's Federal nexus.

In the past, any activity clearing five acres or more required a National Pollutant Discharge Elimination System (NPDES) section 402 permit under the CWA from the EPA. However, the NPDES program was ransferred 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 ACOE. 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 effects on pygmy-owls through another process (eg. Habitat Conservation Planning under section 10 of the Act) 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 project proponents may choose to pursue an HCP.

Our analyses of trends in growth frame the scope of cumulative effects but do not necessarily define those actions that are reasonably certain to occur. There exist, however, certain incremental actions and approvals in the planning and zoning process that do contribute certainty to our analysis of cumulative effects. These actions include existing zoning, land-use

designations within jurisdictional comprehensive plans, transportation plans, population projections, rezoning requests, development plans, plat submittals, and grading and building permit application and approvals. It may be reasonably assumed that these actions, when considered in the context of recent trends, can give us a clear picture of the potential for cumulative effects that are reasonably certain to occur.

The general trend for the action area is for increasing residential development. The Town of Marana, which contains the action area, 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). More recently, from 2000 to 2002, total permits issued by Marana increased approximately 26% (PAG 2003). We have received, and continue to receive notification of numerous new housing subdivisions and commercial developments in this region as well. 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). Not all of this growth occurs within the action area, nor are pygmy-owls affected by all growth. However, within Marana, growth increased 52% between 2000 and 2003, compared to only 8% for Pima County as a whole (PAG 2003). As described above, portions of the action area are highly likely to continue to experience effects from urbanization. New housing construction, and its associated commercial developments and capital improvements, will continue to contribute to the loss and fragmentation of pygmy-owl habitat.

Within CHU 3, land ownership falls into two primary categories, private lands and State Trust lands. Much of the private land has already been developed, and the remaining undeveloped private lands can be expected to be developed. The State Land Department has identified Trust lands along Tangerine Road, Thornydale Road, and Camino de Mañana as suitable for commercial and medium density residential development (includes uses as intense as apartments) (ASLD 2000), indicating that State Trust Lands are likely to contribute to impacts to pygmy-owls and their habitat within the action area. However, there is also the potential for these lands to contribute to the conservation of important pygmy-owl habitats.

Private lands within the action area have jurisdictional approvals or designations (zoning, development plans, planning designations, etc.) that indicate continued development is reasonably certain to occur. We have searched the land use and zoning designations for Marana and Pima County for the action area. In light of documented trends and based on the existing zoning, submitted development plans or subdivision plats, transportation plans and development impact fee areas, we have determined that projects affecting pygmy-owls and pygmy-owls habitat, without a Federal nexus, are reasonably certain to occur at the following areas: Cortaro Road/Thornydale Road intersection, Tangerine Road/Thornydale Road intersection, Hardy Road/Thornydale Road intersection, Heritage Highlands development area, Tangerine Road/Camino de Oeste area, Camino de Mañana/Linda Vista area, and single-lot residential development throughout the action area. Proposed development would consist of commercial projects, residential subdivisions, and single-family residences.

There have been a number of recent lower-density developments proposed, such as Butterfly Mountain and Saguaro Canyon Ranch. In addition, some project proponents have chosen to cluster development at higher densities, leaving larger blocks of undisturbed desert and wash vegetation (Dove Mountain and Sky Ranch). If implemented for future projects, both of these approaches would 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 that were rezoned from low-density zoning to a higher density. Based on projects with which we are familiar, this trend is likely to continue, but probably to a reduced extent.

A development currently under review in the Town of Marana, Tangerine Crossing, will cover approximately 300 acres and is located within two miles to the east of this project. Because ongoing dialogue between the owners of Tangerine Crossing and us 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. However, we have received information from the Town of Marana, the authorizing municipality, that indicates that this project will result in at least 50% ground disturbance. A number of project proponents have submitted development proposals to us for the area south, east, and southwest of the proposed project, but they have not entered formal consultation.

These cumulative effects will contribute to habitat fragmentation because most occur adjacent to roadways and will increase the linear extent of unsuitable habitat across the action area and CHU 3. The areas where we anticipate cumulative effects to occur support known breeding home ranges for the pygmy-owl, as well as dispersal habitat and pathways. These effects will not only reduce available pygmy-owl breeding habitat, but will also reduce habitat connectivity and the opportunity for pygmy-owl movements throughout the action area. However, the majority of the outlined cumulative effects will occur in the southern and eastern portions of the action area, some distance from the proposed project. Because of the conservation measures outlined in the proposed action, the contribution of this action to ongoing cumulative effects is reduced.

Much of CHU 3 is already developed and fragmented, primarily in the area to the south and east of this project. As a result, any additional loss or fragmentation of pygmy-owl habitat may affect 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 effect 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 section 7 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. As stated in the Environmental Baseline section, CHU 3 has supported one of the highest documented concentrations of pygmy-owls in Arizona.

Conclusion

After reviewing the current status of the pygmy-owl, the environmental baseline for the action area, the effects of the proposed residential 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. This project does occur within proposed critical habitat for the pygmy-owl. However, the amount of undisturbed vegetation, and the conservation measures identified in this BO and the BA, address the 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. In making our determination we considered the following:

- The status of the pygmy-owl in Arizona is tenuous. The number of adult pygmy-owls documented in Arizona has never exceeded 50 since regular survey and monitoring work began in 1993. In both 2002 and 2003, the number of known pygmy-owl nests in the State was three and four respectively, down from the highest number, 13, documented in 2001. Although sample size is low and the monitoring period short, there appears to be a declining trend in population that has somewhat corresponded with recent drought conditions. However, in and around the action area, drought should not have such a marked effect due to artificial water sources, enhanced vegetation, and increased prey availability. Nonetheless, pygmy-owls within CHU 3 have declined from a high of 11 in 2000 to only 3 in 2003.

- CHU 3, including the action area, has been subject to rapid growth and urbanization. Existing natural habitats have been lost and fragmented. Growth in the Town of Marana, the primary jurisdiction within the action area, exceeded 400% during the past decade. Oro Valley, also within CHU 3, had 310% growth during that same time period. While some recent development projects have utilized lower housing densities or clustered development, many of the residential subdivisions being developed are high density (4-6 houses/acre). Many of the roads in the action area are slated for expansion or improvement, and at least one new highway interchange is under development. Some sites within the action area have been designated for pygmy-owl conservation as a result of completed section 7 consultations.

- With the recent EPA transfer of the section 402 CWA NPDES program to the State of Arizona, the number of projects with a Federal nexus has been reduced within the action area. Single-family residence construction typically does not have a Federal nexus. Cumulative effects considered in our analysis include residential subdivisions, single-family residences, and commercial projects where zoning, development plans, subdivision plats, or impact fee assessment make them reasonably certain to occur, but no Federal nexus is anticipated. Areas where these cumulative effects are anticipated to occur include areas where pygmy-owl breeding home ranges and dispersal pathways have been documented. Cumulative effects are likely to continue to further fragment habitat.

- The Applicant has included a number of conservation measures that will meaningfully reduce the effects of the proposed action on pygmy-owls by 1) minimizing noise and vegetation disturbance if a pygmy-owl is detected on the project site prior to and/or after commencement of construction, reducing the extent of direct effects; 2) minimizing the

indirect effects of this development (pet predation, pesticides, lighting, inappropriate activities within the conserved open space, etc.) on pygmy-owls; 3) limiting vegetation impacts to 20% of the project site; 4) conserving 80% of the project site as natural open space; and 5) maintaining habitat connectivity by leaving the washes in a natural state.

In summary, our conclusions are based on the record of this consultation including the BA, correspondence and meetings with the project proponents, the information outlined in this BO, and the following:

1. The project site is within a known pygmy-owl home range. However, no pygmy-owls are known to currently occupy this home range; therefore, the likelihood of lethal take is minimal.

2. Conservation measures will be implemented to reduce effects to the pygmy-owl in the face of declining pygmy-owl population status, baseline conditions characterized by reduced and fragmented habitat availability, and substantial cumulative effects. These measures include contingencies to avoid noise and habitat disturbance of any pygmy-owl that may establish a home range on or adjacent to the proposed project site.

3. Habitat disturbance will not exceed 14.4 acres (20% of the 72-acre project site; 0.02% of Critical Habitat Unit 3) and the disturbance will occur in a configuration that will still allow the potential for nesting and movement, therefore effects do not rise to the level of adverse modification of proposed critical habitat.

4. The effects of losing 14.4 acres of suitable habitat and the associated constituent elements will be partially minimized through the protection of approximately 57 acres within the project site (80% of the project area). These protected lands will remain undisturbed and be managed in a manner that will protect suitable habitat for the pygmy-owl and contribute to its conservation.

5. Conserved open space will maintain connectivity within the project site and to adjacent suitable habitat areas offsite, minimizing the impact of adjacent cumulative effects.

6. Conserved open space will provide habitat suitable for breeding, sheltering, feeding, and movement, partially offsetting adjacent and regional cumulative effects.

7. An annual report will be submitted to us outlining the progress and extent of the implementation of pygmy-owl conservation measures.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is defined (50 CFR §17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly

impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR §17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns 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 sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount or Extent of Take Anticipated

We do not anticipate the proposed action will incidentally take any pygmy-owls.

Reporting Requirements/Disposition of Dead or Injured Listed Animals

Should a dead or injured threatened or endangered animal be found, initial notification must be made to the FWS's Division of Law Enforcement, 2450 West Broadway #113, Mesa, Arizona 85202 (480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, 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 USFWS 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 Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the pygmy-owl. In furtherance of the purposes of the Act, we recommend implementing the following discretionary actions:

- 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.

- Continue to actively participate in regional planning efforts, such as Pima County's Sonoran Desert Conservation Plan (SDCP) and the Town of Marana's HCP, and other conservation efforts for the pygmy-owl.

- Assist in the implementation of recovery tasks identified in the pygmy-owl Recovery Plan when approved by the FWS.

- Monitor the effectiveness of conservation measures associated with issuance of authorized permits.

REINITIATION-CLOSING STATEMENT

This concludes formal consultation with the ACOE on the proposed Estates at Tortolita Preserve Residential Development Project in the Town of Marana, Pima County, Arizona. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We have assigned log number 02-21-03-F-0417 to this consultation. Please refer to that number in future correspondence regarding this consultation. Any questions of comments should be directed to Scott Richardson at (520) 670-6144 (x 242) or Sherry Barrett at (520) 670-6144 (x 223).

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
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ

Acting Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Army Corps of Engineers, Tucson, AZ (Attn: Marjorie Blaine)
Moore Corridor, Ltd., Tucson, AZ (Attn: Robert Schwartz)
Arcadis G&M, Tucson, AZ (Attn: Mark Hanshaw)

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Appendix A

Concurrence

We concur with ACOE's determination that the proposed action may affect, but is not likely to adversely affect, the endangered lesser long-nosed bat *(Leptonycteris curasoae yerbabuenae)*. 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 2002a). 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 an adverse effect 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 desertscrub, 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 acres at densities of 10-200 per acre, generally between the elevations of 3,000-6,000 feet Parry's agave is found between 5,000-8,200 feet 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 1988).

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 40 miles 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 2002a). 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 effects, 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 approximately 57 acres of conserved open space on the project site, we concur with the Corps'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:

- 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.

- Indirect adverse effects are considered insignificant (i.e., small size, extent of the effects). 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.

- The proposed action includes conservation of native plants, including saguaros, in accordance with the Town of Marana's native plant protection ordinance.