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AESO/SE  
02-21-03-F-0489

August 31, 2004

Ms. Cindy Lester P.E.  
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: 2000-00788-RJD

Dear Ms. Lester:

This letter and biological opinion responds to your September 3, 2003, request for section 7 consultation on the effects of the Cortaro Crossings project located in Pima County, Arizona (T12S, R13E, Sec. 29) on the endangered cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) (pygmy-owl) and its proposed critical habitat 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 and formal conference on its proposed critical habitat. We responded to your request and initiated formal consultation through our letter dated November 7, 2003.

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 June 2003 Biological Assessment and the August 13, 2003, revised Biological Assessment (collectively BA) prepared by Westland Resources for the U.S. Army Corps of Engineers (ACOE) on behalf of New World Development (Applicant); (2) a tentative plat provided by the Applicant; (3) preliminary landscaping plans provided by the Applicant; (4) various correspondence and meetings among the Applicant, their consultant, and us; and (5) other sources of published and unpublished information.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-0489 to this project. Please refer to that number in future correspondence on this consultation.

## **BIOLOGICAL OPINION**

### **Consultation History**

- September 26, 2002: We sent a letter to the Applicant indicating the project site is within a pygmy-owl home range and outlining potential effects to habitat.
- January 22, 2003: We held a meeting with the Applicant and the Applicant's consultant regarding project concepts.
- March 14, 2003: We participated in a site visit with the Applicant and the Applicant's consultant to discuss the project design as apartment buildings.
- March 25, 2003: We held a follow-up site visit with the Applicant and the Applicant's consultant to review staked development areas.
- June 2003: We received the original BA from Applicant's consultant.
- July 9, 2003: We held a meeting with the Applicant and the Applicant's consultant to discuss a changed scope of the project.
- July 28, 2003: We held a meeting with the Applicant and the Applicant's consultant to discuss project elements as a single-family residential development project.
- August 14, 2003: We received a revised BA from Applicant's consultant.
- September 8, 2003: We received a letter and information from ACOE requesting initiation of formal consultation.
- November 7, 2003: We sent a letter to ACOE initiating consultation.
- November 21, 2003: We received a preliminary plat from the Applicant.
- December 2, 2003: We received preliminary landscaping plans from the Applicant.
- May 27, 2004: We sent the draft BO to ACOE and the Applicant.
- July 9, 2004: We received comments from ACOE and the Applicant.

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

The 39.9-acre project parcel is undeveloped land located south of Cortaro Farms Road and east of Thornydale Road in Pima County, Arizona. Cortaro Farms Road forms the northern boundary of the subject property and will provide access to the subdivision from the northeast corner of the property, while primary access from the west side of the project will be off of Thornydale Road. The southeastern boundary of the site is developed as high-density residential. The southern

boundary of the site is undeveloped. The western boundary abuts Thornydale Road and, across Thornydale, is moderate-density residential development (1 to 2 acre lots). Commercial retail development occurs along the northern boundary of the subject property. Adjacent to the eastern boundary of the retail facility is a graded parcel being developed for additional retail uses.

The Applicant proposes a development plan that will include 14.9 acres as Natural and Restored Open Space. Residential development, offices, and other associated infrastructure will occur on the remaining 25.0 acres. In changing from their original proposal to construct multi-family dwellings, the Applicant submitted a revised project plan reflecting input provided by us during two separate meetings held in July of 2003. At these meetings, specific concerns regarding the intensity of planned development activities, vegetated buffers, and the uses allowed within natural open space were discussed. The Applicant's efforts to address these issues, including a reduction in the number of development units, have been incorporated in the revised development plan presented in the revised BA.

Under Pima County zoning, the project site is zoned Transitional Zone (TR). Allowable uses in the TR zone include any use as permitted in Sections 18.25.010 (CR-3 Single Residence Zone), 18.27.010 (CR-4 Mixed Dwelling Type Zone) and 18.29.010 (CR-5 Multiple Residence Zone), such as library or museum, hospital or sanatorium, professional or semi-professional office, real estate office, and motel or hotel. The Applicant is proposing to develop single-family residential homes in the eastern portions of the project site (approximately 118 lots per the preliminary plat) and commercial office space on the five-acre portion of the project site that borders Thornydale Road. The development plan includes planned development areas with significant habitat modifications and identifies protected open space and restoration areas planned to provide vegetated corridors. Development with habitat modification totals approximately 25.0 acres. Approximately 0.24 acre of jurisdictional waters will be lost to roadway construction and associated utilities. Off-site utilities necessary for site development are expected to be constructed in public rights-of-way. The acreage of disturbance from on-site residential, office, utility, and roadway construction totals approximately 25.0 acres (62.6 % of the 39.9-acre project site).

Three roads will provide access to the property from Cortaro Farms Road; additional access will be provided from Paseo Del Rancho Escondido. Two driveways will provide access to the commercial office facilities from Thornydale Road. An internal access road crossing the unnamed wash within the natural open space of the project will also be used as a utility corridor for underground utilities. Through landscaping, some of the disturbance associated with construction in this corridor will be revegetated with a native seed mix and transplanted or containerized native trees and shrubs.

Landscape buffers will be established along both Cortaro Farms Road and Thornydale Road. Along Thornydale Road, east of the constructed drainageway that parallels the road, a landscape buffer will extend south from the existing commercial properties at the southeast corner of Cortaro and Thornydale roads to the natural open space depicted on the Project Plan. This landscape buffer along Thornydale Road will be 20 feet in width and will be approximately 660 feet in length. Two driveway access points for the planned commercial office facilities will cross this buffer. Along Cortaro Farms Road, landscape buffers will be constructed within the

project boundaries. From the northeastern corner of the project to Paseo Del Rancho Escondido, the landscape buffer will be 30 feet in width and approximately 746 feet in length. From Paseo Del Rancho Escondido west to the natural open space corridor being preserved through the project, the landscape buffer will be 20-feet wide and approximately 369 feet in length. Three roads providing access to residential development within the property will cross the landscape buffer yards along Cortaro Farms Road. The landscape buffers will be planted with salvaged and containerized native trees and shrubs and with native succulents salvaged from the property or purchased for that purpose. Native tree plantings within the landscape buffer will be planted, on average, at 35-foot centers.

The restoration and enhancement activities that will be conducted in the retention/detention basins and other designated areas on the project plan will supplement existing areas of vegetation with new, additional plantings and vegetate areas lacking vegetation with native plantings at densities meeting or exceeding existing vegetation within the conservation area. Trees will be planted in a mix of canopy-to-canopy and more open groupings composed of *Olneya tesota*, *Acacia constricta*, *Acacia greggii*, *Celtis pallida*, *Prosopis velutina*, *Parkinsonia microphylla*, and succulents salvaged from other on-site areas, along with additional container grown stock of these species. Saguaros and other smaller cacti salvaged from the project site will be transplanted to these areas at densities similar to those currently existing on-site. The ground surface for areas being restored will receive a native seed mix composed of shrubs, forbs and annuals indigenous to the site. Transplanted and container grown trees and shrubs will be irrigated by an automatic, underground drip irrigation system until these plants have become safely established. Once established, irrigation will be gradually decreased until the plants can survive without supplemental irrigation.

Three of the detention/retention basins within the project area will be vegetated and will enhance the primary open space corridor traversing the project. An approximately 0.47-acre retention/detention basin will be constructed adjacent to the middle portion of the natural open space corridor that bisects the property. This location was selected based on engineering requirements and will add to the overall, vegetated-width of the corridor at this point on the property. Native trees and shrubs will be used to vegetate this basin in a manner that enhances the overall function of the corridor. A second, approximately 0.49-acre on-site retention/detention basin will be constructed at the southern edge of the planned residential development, adjacent to the open space corridor. The third retention/detention basin within the Project Plan is located at the southern end of the proposed commercial office land use adjacent to Thornydale Road. This basin is approximately 0.24 acre in size.

Immediately east of the existing retail commercial facility located at the southeast corner of Thornydale and Cortaro Roads, lands under separate legal ownership (Cortaro 1) were previously cleared of native vegetation in anticipation of planned commercial construction activities authorized by an approved development plan. The southern half of this cleared area and adjacent disturbed habitats totaling approximately 2.27 acres have been incorporated into this project plan and will be restored using salvaged and/or containerized native trees and shrubs to enhance the overall effectiveness of the natural open space corridor. In addition, the approximately 0.37-acre retention/detention basin that will be constructed as part of the Cortaro

1 Development will be revegetated as indicated on this project plan to further enhance the natural open space corridor.

A variety of fencing materials may be used to delineate and restrict access to the protected open space in the project area. Fence types that may be used include block walls, wrought iron, tubular steel fencing, and other similar decorative fence types. Chain link and/or hog wire fencing will not be used. Portions of the project area will be raised with fill material. At the boundaries of developed areas with natural open space, these slopes will be stabilized with rock riprap or other suitable construction materials. Depending upon the fencing materials used and the height of the fill slope, minor temporary disturbance within the open space areas may occur to provide adequate, safe construction access.

Project development will be the responsibility of the Applicant. A Reserve Area Management Plan, implemented through CC&Rs and deed restriction, will restrict future grading and clearing activities within the protected natural open space depicted in the project plan.

### Open Space Management

The property lies within Unit 3 of proposed pygmy-owl critical habitat (USFWS 2002). Because it supports high quality pygmy-owl habitat and because of the proximity of the area to known pygmy-owl sites, an area within Unit 3 has also been designated as a Special Management Area (SMA) in the Draft Pygmy-owl Recovery Plan (USFWS 2003). According to the Draft Recovery Plan, the SMA designation is due to the area's importance for dispersal, nesting, and overall recovery of the pygmy-owl in northwest Tucson. Guidelines for development in the SMA that are included in the Draft Recovery Plan suggest that development projects be configured to protect the highest quality pygmy-owl habitat and maintain connectivity within the project area and landscape in general. The guidelines further indicate that "ground disturbance, which would preclude the ability of pygmy-owls to meet their life history requirements" should be avoided and that "configuration of open space to promote nesting and dispersal is essential".

Approximately 63% of the subject property will be cleared for development of the project. The remaining habitat will be maintained for conservation of the pygmy-owl. Native vegetation and wildlife habitat, including high-value xeroriparian wash habitat, will be maintained on 14.9 acres (approximately 37 % of the project) and will remain as natural open space (the Conservation Lands).

The Conservation Lands will be protected through deed restrictions and implementation of a permanent Reserve Area Management Plan. The Homeowners Association (HOA) will own the Conservation Lands and administer the Reserve Area Management Plan. The Reserve Area Management Plan specifies restrictions and the accepted activities that can take place within the Conservation Lands (see Appendix A of the BA). Aspects of the Reserve Area Management Plan include, but are not limited to:

- limited access;
- inspections for vandalism, dumping, and other habitat damage;
- prohibition of motorized vehicle use, the application of pesticides, artificial lighting, events consisting of more than 10 people, plant salvage, disturbance of native vegetation, use of fire or outdoor cooking, and equestrian use;
- control of exotic plant invasions;
- restricted access to domestic dogs and cats;
- ongoing pygmy-owl surveys until vegetation clearing is complete;
- monitoring and reporting; and
- funding.

The HOA will provide an annual report to the Corps of Engineers and us, providing documentation of compliance with conservation elements of the Reserve Area Management Plan. Annual monitoring will document signs of unauthorized use within the Conservation Lands. The HOA will be responsible for identifying and stopping, by appropriate means, any unauthorized use of the Conservation Lands.

#### Development Constraints

Effects to the resident pygmy-owl<sup>1</sup> whose home range overlaps the project site are addressed in Section 5 of the BA, and the measures discussed above were incorporated to address those effects. Additionally, the Applicant has indicated that the following development constraints will be implemented if a new pygmy-owl territory or nest site is detected on or immediately adjacent to the site. The Applicant is incorporating into the proposed project specific conservation measures to guide development in the event that a new pygmy-owl nest site or territory center is detected within 600 meters of the project. This conservation restriction outlines the scenarios in which a pygmy-owl establishes a territory in the vicinity of the proposed project prior to or after the initiation of construction. In these specific scenarios, we have determined that certain continued construction activities would not harm or harass a pygmy-owl as defined by the Act.

In these scenarios, four zones are described (presented here as Zone I through IV). These zones are based upon the distance of construction activity from a known nest or activity center.

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<sup>1</sup> There is an adult male pygmy-owl known to have inhabited the neighborhood across Thornydale, west of the project site for the past 4 years, and this owl is still in the vicinity this year. This bird has been telemetered and over 100 telemetry locations have been noted, none of which are on the project site or otherwise east of Thornydale. However, because telemetry monitoring has not been constant, we cannot conclude that this pygmy-owl has only used areas described by the telemetry locations. Therefore, a circle encompassing a 280-acre area is used to describe this owl's home range as described elsewhere in this document. The project site falls within this 280-acre circular home range.

Certain levels of construction can occur within each of these zones without resulting in a situation that reaches the level of effect not already considered in the analysis of potential project impacts. Situations that fall outside of the parameters described below or that do not comply with the restrictions provided for in each of the zones described below will require that the Applicant coordinate with the ACOE and us to determine if re-initiation of consultation is required prior to continuing with the construction activities in question. Specific development restrictions that apply to each of the four zones are described in the sections below.

#### Zone I. 0 to 100 Meters from the pygmy-owl Activity Center

1. Any additional clearing of vegetation will be permitted only if authorized through reinitiation of consultation.
2. Construction-related activities may continue on lands that have already been cleared of vegetation provided that they do not exceed the levels/intensity of activity that was occurring during the period of time that the territory was established.
3. Activities that would be more intense or cause greater levels of noise disturbance than was occurring during the period of time that the territory was established cannot proceed absent reinitiation of consultation.

#### Zone II. 100 to 400 Meters from the pygmy-owl Activity Center

1. Any additional clearing of vegetation will be permitted only if authorized through reinitiation of consultation.
2. No restrictions on the nature or type of construction activity (excluding the clearing of vegetation) from August 1<sup>st</sup> through January 31<sup>st</sup> of the following calendar year, provided it is in accordance with the approved project plan.
3. Construction activities during the breeding season (February 1<sup>st</sup> to July 31<sup>st</sup>) cannot exceed the levels or intensity of activities that occurred at the time the territory was established absent reinitiation of consultation.

#### Zone III. 400 to 600 Meters from the pygmy-owl Activity Center

1. Any additional clearing of vegetation will be permitted only if authorized through reinitiation of consultation.
2. No restrictions on the levels or intensity of construction activity (excluding the clearing of vegetation) at any time of the year, provided it is in accordance with the approved project plan.

#### Zone IV. Greater than 600 Meters from the pygmy-owl Activity Center

1. No restrictions of any activity consistent with the project description provided in the BA.

### Cactus Ferruginous Pygmy-owl Surveys

Prior to commencement of grading within each construction phase of the project, the Applicant will confer with us in-lieu of conducting annual surveys. However, if the status of pygmy-owl on the adjacent property changes, surveys will be conducted for the presence of pygmy-owls in accordance with the approved survey protocol. Any detection of a pygmy-owl shall be reported to both agencies within 24 hours.

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

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

### Species Description

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

### Listing and Critical Habitat

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

on November 27, 2002 (USFWS 2002). The proposal includes approximately 1,208,000 acres in portions of Pima and Pinal counties, Arizona.

The plaintiffs appealed the District Court's ruling on the listing of the pygmy-owl as a distinct population segment. On August 19, 2003, the Ninth Circuit Court of Appeals rendered an opinion regarding this appeal, which held that, although we did not arbitrarily find the Arizona pygmy-owl population to be discrete, we arbitrarily found the discrete population to be significant. The judgment of the District Court was reversed and the case was remanded to the district court for further proceedings consistent with the Ninth Circuit's opinion (No. 02-15212, CV 00-0903-SRB). Prior to being remanded to the district court, Defenders of Wildlife, intervenors on the original 2001 lawsuit, filed a petition with the Ninth Circuit for rehearing, or, in the alternative, rehearing *en banc*. This petition was denied, and the matter returned to the District Court. The District Court ruled on June 28, 2004, remanding the Listing Rule to us for further proceedings consistent with that order and the opinion of the Court of Appeals for the Ninth Circuit. The Listing Rule was left in place pending the outcome of our reconsideration. We are required to provide a status report to the Court in January 2005.

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 (USFWS 2002). 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 (USFWS 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 its historical range in Arizona (University of Arizona 1995, Tibbitts 1996, Abbate *et al.* 1999, 2000). These winter records suggest that pygmy-owls are found within Arizona throughout the year and do not appear to make any sort of seasonal migration.

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

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

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. Documented and suspected pygmy-owl

predators include great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), screech owls (*Otus kennicottii*), and domestic cats (*Felis domesticus*) (Abbate *et al.* 2000, AGFD 2003). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999).

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*) 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 (*Parkinsonia florida*), foothills paloverde (*P. 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 (*Cylindropuntia* and *Opuntia* spp.), fishhook 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 mountainsides 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. The occurrence of these areas is more limited than the overall distribution of Sonoran Desertscrub.

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

While plant species composition differs among these communities, there are certain unifying characteristics such as the presence of vegetation in fairly dense thickets or woodlands, the presence of trees, saguaros, or organ pipe cactus large enough to support cavities for nesting, and elevations below 1,200 meters (m) (4,000 feet (ft)) (Swarth 1914, Karalus and Eckert 1974,

Monson and Phillips 1981, Johnsgard 1988, Enriquez-Rocha *et al.* 1993, Proudfoot and Johnson 2000). Large trees provide canopy cover and cavities used for nesting, while the density of mid- and lower-story vegetation provides foraging habitat and protection from predators, and it contributes to the occurrence of prey items (Wilcox *et al.* 2000). Perch substrates used by pygmy-owls for calling are typically the tallest trees available within a home range, though pygmy-owls have also been noted calling from within saguaro cavities (Flesch 2003a).

The density of trees and the amount of canopy cover preferred by pygmy-owls in Arizona has not been fully defined. However, preliminary results from a habitat selection study indicate that nest sites tend to have a higher degree of canopy cover and higher vegetation diversity than random sites (Wilcox *et al.* 2000). Overall vegetation density may not be as important as patches of dense vegetation with a developed canopy layer interspersed with open areas. Vegetation structure may be more important than species composition (Wilcox *et al.* 1999, Cartron *et al.* 2000a). 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 (USFWS 1997).

The northernmost historical record for the pygmy-owl is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the pygmy-owl to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, the pygmy-owl, prior to the mid-1900s, was "not uncommon," "of common occurrence," and a "fairly numerous" resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Additionally, pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (Hunter 1988, AGFD 2002a).

Records from the eastern portion of the pygmy-owl's range include an 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)<sup>2</sup>. Most of these pygmy-owls were distributed in four general areas: northwest Tucson, southern

Pinal County, Organ Pipe Cactus National Monument, and the Altar Valley. We believe that more pygmy-owls exist in Arizona, but systematic surveys have not been conducted in all areas of potential habitat. Table 1 summarizes the numbers of pygmy-owls documented since 1993, excluding Tribal lands.

Table 1. Numbers and distribution of documented pygmy-owl locations 1993 - 2003 (Abbate *et al.* 1996, 1999, 2000, AGFD 2002a)

<b>Area</b>	<b>Year</b>	<b>Sites</b>	<b>Adults</b>	<b>Young</b>
<b>Northwest Tucson</b>	1993-1997	9	19	6
	1998	4	7	11
	1999	6	10	16
	2000	8	11	11
	2001	5	8	10
	2002	9	9	2
	2003	4	4	0
<b>Pinal County</b>	1993-1997	2	6	1
	1998	2	2	0
	1999	3	5	5
	2000	2	3	5
	2001	0	0	0
	2002	1	1	0
	2003	0	0	0
<b>Area</b>	<b>Year</b>	<b>Sites</b>	<b>Adults</b>	<b>Young</b>

<sup>2</sup> These figures do not include documented pygmy-owl locations on the Tohono O'odham Nation.

<b>Altar Valley</b>	1998	2	4	unknown
	1999	14	18	11
	2000	6	8	4
	2001	11	18	12
	2002	8	10	7
	2003	5	9	16
<hr/>				
<b>Organ Pipe Cactus National Monument and Cabeza Prieta National Wildlife Refuge</b>	1993-1997	2	2	0
	1998	1	2	4
	1999	3	4	unknown
	2000	6	8	0
	2001	7	10	5
	2002	3	4	0
	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 than early information indicated (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 Arizona.

The patchy, dispersed nature of the pygmy-owl populations in Arizona (Abbate et al. 2000) and Mexico (Flesch 2003b) suggests that the overall population may function as a metapopulation. A metapopulation is a set of subpopulations within an area, where movement and exchange of individuals among population segments is possible, but not routine. A metapopulation's persistence depends on the combined dynamics of the productivity of subpopulations, the maintenance of genetic diversity, the availability of suitable habitat for maintenance and

expansion of subpopulations, and the “rescue” of subpopulations that have experienced local extinctions by the subsequent recolonization of these areas by dispersal from adjacent population segments (Hanski and Gilpin 1991, 1997). The local groups of pygmy-owls within Arizona may function as subpopulations within the context of metapopulation theory. However, more information is needed regarding the population dynamics of pygmy-owls in Arizona.

The ability and opportunity for pygmy-owls to disperse within population segments, as well as emigrate to adjacent population segments is likely important for the long-term persistence of pygmy-owls in Arizona. Pygmy-owl dispersal patterns are just beginning to be documented. A banded juvenile in Arizona was observed in 1998 approximately 3.9 km (2.4 mi) from its nest site following dispersal. Five young monitored with radio telemetry during 1998 were recorded dispersing from 3.5 km (2.17 mi) to 10.4 km (6.5 mi) for an average of 5.9 km (3.6 mi) (Abbate *et al.* 1999). In 1999, 6 juveniles in Arizona dispersed from 2.3 km (1.4 mi) to 20.7 km (12.9 mi) for an average of 10 km (6.2 mi) (Abbate *et al.* 2000). In Arizona, the maximum documented dispersal distance is 34.8 km (21.8 mi) (AGFD 2002b). However, monitoring of a dispersing female pygmy-owl in 2004 has revealed a total distance traveled of over 130 km (80 mi) (AGFD 2004).

With so few individual pygmy-owls in Arizona, the maximum dispersal distance may be periodically needed to maintain genetic interchange between groups of pygmy-owls. Results of preliminary genetic analysis (Proudfoot and Slack 2001) and observations of incestuous breeding provide evidence that genetic variability may be low within northwest Tucson. On two separate occasions in this area, siblings of the same nest were documented breeding with each other the following year (Abbate *et al.* 1999). Instances of sibling breeding may be a reflection of small isolated populations of pygmy-owls, and maintaining genetic diversity within depressed populations is important to maintain genetic stochasticity and fitness. AGFD (Abbate *et al.* 1999) has documented movement between pygmy-owl groups in southern Pinal County and northwest Tucson, and maintaining this genetic interchange is important.

Juveniles typically disperse from natal areas in July and August and do not appear to defend a territory until September. They typically fly from tree to tree instead of long flights, but may move up to 1.6 km (1 mi) or more in a night (Abbate *et al.* 1999). Trees of appropriate size and spacing appear to be necessary for successful dispersal, but specific data describing this pattern are currently unavailable. Once dispersing male pygmy-owls settle in a territory (the area defended by a pygmy-owl), they rarely make additional movements outside of their home range (the area used on an annual basis). For example, spring surveys have found male juveniles in the same general location as observed the preceding autumn (Abbate *et al.* 2000). However, unpaired female dispersers may make additional movements that sometimes continue into the subsequent breeding season (AGFD 2003).

### Reasons For Listing

In determining whether listing of the pygmy-owl was warranted, we were required under section 4(a)(1) of the ESA to consider five listing factors: a) the present or threatened destruction, modification, or curtailment of its habitat or range; b) overutilization for commercial, recreational, scientific, or educational purposes; c) disease or predation; d) the inadequacy of

existing regulatory mechanisms; or e) other natural or manmade factors affecting its continued existence. We determined in the 1997 listing that the following three factors applied to the pygmy-owl - Arizona Distinct Population Segment (DPS) to the extent that endangered status is appropriate (USFWS 1997). Pursuant to the recent (June 28, 2004) court decision, the pygmy-owl listing rule has been remanded to us and we will be evaluating the status of the species consistent with the Court Order.

*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 (USFWS 1997, Abbate *et al.* 1999). The complete removal of vegetation and natural features required for many large-scale and high-density developments, and the increased fragmentation of habitat caused by urban sprawl, directly and indirectly affects the pygmy-owl within some portions of its range in Arizona (Abbate *et al.* 1999).

*Factor 4 - Inadequacy of existing regulatory mechanisms.*

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

*Factor 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. Furthermore, ingestion of affected prey items may cause death or reproductive failure (Abbate *et al.* 1999). Illegal dumping of waste also occurs in areas occupied by pygmy-owls and may be a threat to pygmy-owls and their prey; in one case, drums of toxic solvents were found within one mile of a pygmy-owl detection (Abbate *et al.* 1999). No specific research has been conducted to determine what, if any, effects pesticides are having on pygmy-owl populations in Arizona.

### 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 (documented pair) 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). These pygmy-owls were unable to be located later that same year, and only the male was present the following year. As recently as 2003, property owners have expressed concerns 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 raccoons (*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). Recent research indicates that predation likely plays a key role in pygmy-owl population dynamics, particularly after fledging and during the post-breeding season (AGFD 2003). Additional research is needed to determine the effects of predation, including nest depredation, on pygmy-owls in Arizona and elsewhere.

Hematozoa (blood parasites) may cause neonatal bacterial diarrhea, marginal anemia, and septicemia (Hunter *et al.* 1987), reducing survival and recruitment of birds. However, no evidence of hematozoa in pygmy-owls in Texas (Proudfoot and Radomski 1997) or Arizona (Proudfoot *et al.* unpubl. data) has been recorded. Trichomoniasis also can cause mortality of raptors (e.g., Cooper's hawks in Tucson) (Boal *et al.* 1998) that ingest doves and pigeons, but the effects of this disease on pygmy-owls in Arizona are 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 (Proudfoot 2004). 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 that contained an active pygmy-owl nest. In Texas, a domestic cat killed two adult pygmy-owls and one fledgling. These pygmy-owls used a nest box about 75 meters from a human residence. In northwest Tucson, predation by domestic cats is also suspected by researchers in two instances that occurred in 2001 (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 1). Even with expanded survey efforts since the pygmy-owl was listed as endangered in 1997, there are still many areas within Arizona that have not been surveyed or for which survey efforts are inadequate. Because research has been conducted for only a few years and because research and survey efforts have not been comprehensive or random in nature, it is not possible to determine an exact population size or trend within Arizona. Additionally, the Tohono O'odham Nation supports pygmy-owls, but due to cultural and political considerations, complete information on the numbers and distribution of pygmy-owls on the Nation are not available. Given the historical distribution of pygmy-owls in Arizona, it is clear that they have declined throughout the state to the degree that they are now much more limited in distribution (Monson and Phillips 1981, Davis and Russell 1984, Millsap and Johnson 1988, Proudfoot and Johnson 2000, Johnson *et al.* 2003). Johnson *et al.* (2003) hypothesized that large-scale water development (damming and diversion of the Salt and Verde rivers) led to initial declines in species abundance and distribution in Maricopa County.

Information gathered over the past few years indicates that pygmy-owls occur in Arizona in low numbers and are patchily distributed across southern Arizona. They occur in four main areas of

the state, and numbers found within each area tend to vary on an annual basis (Table 1). Data are insufficient to determine meaningful trends, but given the current low numbers, 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 proposed critical habitat unit 3 (CHU-3), there are only three pygmy-owl sites that are known to be active, and all three consist of 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 potential contribution to the overall survival and recovery of the pygmy-owl in Arizona (this group of pygmy-owls has contributed 40% of the known nests and 42% of the known young produced within Arizona since 1998). Based on recent long-distance dispersal events (AGFD 2004), and the fact that large areas of potential habitat to the north, west, and southwest have not been surveyed adequately, there remains the possibility, although remote, that a female disperser could make its way into northwest Tucson from a number of sources. Telemetry monitoring has documented previous dispersal from Pinal County into northwest Tucson, and habitat conditions remain similar. In the spring of 2004, a female pygmy-owl moved north from the Altar Valley a distance that would have been adequate to move into northwest Tucson if she had moved up the east side of the Avra Valley instead of the west.

The known distribution of the Arizona DPS ranges from the Mexican border to northern Pima County. It may also range north of Pima County, as it was known to do as recently as 2001, but it is not currently known to do so. In recent years the northwest Tucson population was the most reproductively successful portion of the range, but it has now declined to three unpaired males. Reasons for that decline are not completely understood, but it is likely that a combination of drought and continued habitat loss are factors. Regardless of the causes, the northwest Tucson subpopulation will not be rescued until a female pygmy-owl moves into the area, which may require human intervention in the form of population augmentation. As stated above, it seems that the likelihood of one or more female owls immigrating into the area on its own and pairing with one of the few remaining males is remote, but still possible. These time- and site-specific conditions must be considered for this consultation, and future consultations must similarly consider the circumstances surrounding the pygmy-owl at that specific time and place. Northwest Tucson remains important to the recovery of the pygmy-owl in Arizona, and still supports 15% of the known Arizona pygmy-owl population. However, immigration of a female pygmy-owl(s) or population augmentation is needed for this population to significantly contribute to recovery. The presence of even a single female may substantially change the current status of the northwest Tucson population.

The decline documented in northwest Tucson has been mirrored in other groups of pygmy-owls around Arizona. Similar to observations in northwest Tucson, no nesting was documented in Organ Pipe Cactus National Monument (OPCNM) in 2003. Nesting had been documented in OPCNM for the previous several years. The number of pygmy-owls and nests in Altar Valley has also declined (Table 1). It is likely that the ongoing drought has influenced the survival and productivity of pygmy-owls in all areas of Arizona. However, when drought conditions no longer persist, the potential for pygmy-owl populations to rebound relatively quickly exists, particularly with support from the Mexican population. Pygmy-owls breed and reproduce during their first year (Proudfoot and Johnson 2002). The average number of young fledged per successful nest site is over three (AGFD 2003). Several nests have produced five fledglings

(Abbate et al. 1999, 2000). This is not the first time since investigation and monitoring of the northwest Tucson population began that there have only been male owls documented. Only male owls were known in 1993 and 1995. In 1994, 1996, 1997, and 2002, only one female was documented. In each case, with the exception of 2002, an increase in females and population numbers in northwest Tucson subsequently occurred. While conditions have certainly changed over the years, the potential for this group of pygmy-owls to rebound following immigration or augmentation still exists.

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

In addition, we are not aware of any management or conservation practices in Mexico that are directed towards pygmy-owls. The expansion of agricultural and urban land uses increases habitat loss and fragmentation in Mexico and the stability of pygmy-owl populations cannot be determined. In Mexico, millions of acres of Sonoran Desert and thornscrub are being converted to buffelgrass (*Pennisetum ciliaris*), which represents both a direct and an indirect loss of habitat because of invasion into adjacent areas and increased fire frequency and intensity (McLaughlin and Bowers 1982, Burquez-Montijo et al. 2002). Burquez and Yrizar (1997) state that, "Given the government subsidies to establish exotic introduced grasslands, to maintain large cattle herds, and to support marginal cattle ranching, the desert and thornscrub in Sonora will probably be replaced in the near term by ecosystems with significantly lower species diversity and reduced structural complexity, unless control measures are implemented." Such replacement is and will continue to affect pygmy-owl prey base and habitat availability. The importance of the pygmy-owl population in Arizona to the segment of the overall pygmy-owl population occupying Sonoran desertscrub and semi-desert grasslands will increase as habitat is converted in Mexico. In order to reverse the current decline in the pygmy-owl population in Arizona, an influx of pygmy-owls from Mexico will likely be required. However, the long-term potential for Mexico to provide this source of immigrant pygmy-owls is uncertain. Therefore, the importance of existing Arizona pygmy-owl populations may increase if populations south of the border become imperiled.

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 when compared to those found in most of the currently occupied range in Arizona. 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 165 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 49 Federal agency actions have undergone formal section 7 consultations 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. 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 undergo section 7 consultation, 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 spikes in predator populations, 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 that are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

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 600-meter buffer area. We believe that this determination fails to consider all of the indirect effects likely to occur as a result of the action.

We have made an effort to determine action area based on the extent of the indirect effects resulting from the proposed action. The effects considered in determining the action area include

the area affected by (1) increased traffic and other urban effects, and (2) the potential increase in predation from subsidized predators and household pets, domestic cats in particular.

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.

The action area can be partially defined by the portion of the existing transportation network likely to be affected by the construction of the Cortaro Crossings residential and commercial project. The project vicinity is largely urbanized, characterized by residential and commercial developments of varying densities. However, it is unlikely that all the needs of the future residents of this subdivision will be able to be met in the immediate area and it is likely that an appreciable portion, if not all, of the residents will travel by car to work, regional shopping centers, schools, etc. Clientele of the commercial portion of this project will also contribute to traffic flowing into the project area. This project is proposing the development of approximately 118 lots. This translates to an increase of approximately 191 vehicles (the mean number of vehicles per household in Pima County is 1.62 (CTTP 2000)) in this area. With each of these vehicles making the mean number of trips per capita (3.5 in Pima County (PAG 2004)), the result is an additional 668 vehicle trips per day resulting from this project.

It is also reasonable to assume that, because of this incremental increase in traffic volume, it 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; funding for roads is 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. Pima County's proposed improvements to Thornydale Road and Cortaro Farms Road may become a higher priority as this development occurs at the intersection of these major roadways. Pima County has anticipated that growth in northwest Tucson would necessitate widening Thornydale and Cortaro Farms roads and included these roads in their 1997 bond package.

Because the effects from the project define the action area, the action area for Cortaro Crossings includes all pygmy-owl territories and dispersal corridors intersected by those roads likely to be affected by the incremental increases in vehicular traffic from the Cortaro Crossings 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 trip distance to the major arterial streets serving the proposed Cortaro Crossings project, including Thornydale Road, Cortaro Farms Road, Magee Road, La Cholla Boulevard, and Tangerine Road. Furthermore, an interchange has been proposed by the Town of Marana to connect the Linda Vista Boulevard/El Camino de Mañana junction to Interstate 10. This interchange will likely receive high use because it is planned to avoid train delays and because of current and past growth in the area. Thus increased traffic volume from the Cortaro Crossings project is reasonably certain.

Within 10 miles of Cortaro Crossings, 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 effects to three occupied and 12 unoccupied pygmy-owl home ranges and breeding and dispersal habitat adjacent to the affected roadways within 10 miles of the project site. Despite the fact that many of these home ranges are not currently occupied, they remain very important to the persistence of this subpopulation of pygmy-owls because research has shown that some vacant pygmy-owl home ranges have been re-occupied over time (AGFD 2003).

Since domestic cat predation of pygmy-owls has been documented in Arizona (AGFD 2004), the area that could be affected by subsidized predators, such as household cats, can further define the action area. 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). In Tucson, a telemetry study showed that house cats rarely moved more than 300 meters (0.2 mile) from their homes (Goldsmith *et al.* 1991), but a study in Illinois, using similar methodology, showed the mean maximum distance both sexes of domestic cats moved from farmsteads was 1,697 meters (1.1 miles) (Warner 1985).

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. The 900-meter buffer is used because it falls between the extremes represented by the data above (300 meters for the Tucson study and 1,697 meters for the Illinois study). This 900-meter buffer accounts for approximately 1,015 acres of indirect effects, and overlaps the occupied pygmy-owl home range, as well as known dispersal routes adjacent to the project. Of the proposed 118 lots, 38 are likely to have cats based on the national average indicating that 32% of all households have cats (HSUS 2004). Given the national average of 2.0 cats per cat-owning household (HSUS 2004), this development could be expected to contribute 76 additional cats at a given point in time to the area.

The action area for the Cortaro Crossings project is thus defined by the direct and indirect effects resulting from this project, including the effects of habitat disturbance (25 acres), house cats (900 meter radius), and increased traffic and road effects (10 mile mean trip distance). 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 jeopardize the species or adversely modify proposed critical habitat. The action area contains all or portions of four pygmy-owl home ranges and intersects dispersal habitat and known dispersal pathways for an additional 11 pygmy-owl home ranges. Critical habitat was proposed based on pygmy-owl occupancy status and/or their 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 proposed CHU-3, which contains 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 three commercial projects and two residential projects, occurring within two miles of this project, where clearing of vegetation occurred without our input. All of these projects, combined with existing development, contribute to habitat fragmentation and reduce available habitat in the immediate vicinity of this project. Areas large enough to provide for successful breeding and dispersal are essentially non-existent south of this project and limited in all other directions.

The general trend for the action area is for increasing residential and commercial 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 the action area.

Dove Mountain and Heritage Highlands are master planned communities located from approximately six to eight miles north, northwest of Cortaro Crossings and together cover close to 5,600 acres. 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 project is situated in the same area as these two large developments, and construction is beginning on up to 172 acres of the 598 acres of habitat in the project site. These residential, commercial, and golf developments have removed 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, developed a Habitat Conservation Plan (HCP), and was issued a section 10 permit covering over 500 acres of pygmy-owl habitat adjacent to the Section 36 development. While this development is being planned to reduce effects on pygmy-owls, the clustered development will result in further fragmentation of the landscape, but will provide permanent conservation of certain nesting, foraging, and dispersal habitat.

In March 2002, we completed consultation with the EPA on a 100-acre residential development (Butterfly Mountain), also in the same area as the above projects. Butterfly Mountain will result in approximately 17% surface disturbance, but will retain potentially suitable nesting, foraging, and dispersal habitat. A number of project proponents have submitted development proposals to us for the area north and west of the proposed project, but they have not entered formal consultation.

Within five miles (the average dispersal distance recorded for pygmy-owls in Arizona) of the pygmy-owl home range within which this project falls, past and ongoing habitat loss and fragmentation have limited the amount of available breeding habitat and dispersal pathways. In July 2000, we completed a consultation with the EPA for a 20-acre residential development

(Countryside Vistas Blocks 5 and 6) approximately 3 miles to the northwest. In December 2000, we completed a consultation with the EPA for a 29-acre residential development (Tecolote de Oro) approximately 2 miles to the northeast. In July 2001, we completed a consultation on the 7-acre Crescent Ridge Apartments, approximately 1.5 miles to the north. In December 2001, we completed two consultations with the EPA: a 7.86-acre project for Mountain View High School approximately 1.25 miles to the north, and a 141-acre residential development (Hartman Vistas), approximately 3 miles to the northwest. In February 2002, we completed a consultation with the EPA on improvements to Thornydale Road that removed 9 acres of suitable habitat immediately adjacent to this project. In April 2002, we completed consultation with the EPA on a 150-acre residential and commercial development (Chaparral Heights) approximately 2.75 miles to the northeast of the project site.

While none of the above actions rose to the level of jeopardy, "take" through harassment 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 region containing the action area requires consideration of the already 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 resulted in consultation with us. 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. However, as mentioned above, there are many projects, some relatively large and in crucial locations, where we have no opportunity to provide conservation recommendations. Since 1999, we are aware of nine projects in the vicinity of this 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 capital 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 Cortaro Crossings project is situated approximately four miles south and east of a contiguous block of several thousand acres of State Trust land, 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. These State lands have been used by dispersing juvenile pygmy-owls that originated at nests within the action area. Existing development and development proposals in the northern part of CHU-3 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 on pygmy-owls on State Trust lands depends on if they are sold or exchanged, the type of development proposed, and whether section 7 review will take place due to 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. Of more consequence is the fact that the area between these State Trust lands and the project contains locations characterized by existing and proposed development contributing to habitat loss and fragmentation, and the opportunity for pygmy-owls to disperse into these currently undeveloped lands is already diminished.

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). With regard 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 formerly contained high concentration 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 or when population augmentation can occur; 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 draft Recovery Plan states, "Because of the significance of habitat within SMAs, development within these areas should be subject to more detailed analyses. Specifically, consideration should be given to spatial needs, breeding requirements, dispersal patterns, home range and landscape-level movement requirements, and habitat conditions needed for foraging and predator avoidance. These considerations and levels of disturbance should be evaluated at the project level and implemented in a manner that disturbs the least amount of the highest quality pygmy-owl habitat within a project area and results in habitat being distributed in a uniform and connected fashion across the landscape. Additional disturbance, beyond the footprint of construction, from lights, noise, and traffic, should be considered during the assessment of large projects. Implementation of this guideline should also strive to maintain, where possible, relatively large blocks of nesting habitat and, as noted above, habitat for the movement of pygmy-owls within and among Recovery Areas. Maintaining adequate habitat for dispersal and nesting in proximity to known nest sites is needed for expanding, maintaining, and establishing subpopulations that are essential to the long-term maintenance of pygmy-owls in Arizona. We also suggest that relatively high conservation values be placed on areas within SMAs that are deemed especially important for maintaining habitat or movement corridors for pygmy-owls (e.g., the southern portion of the Northwest Tucson SMA)" (USFWS 2003). The Cortaro Crossings project site falls within the High-value Conservation Area established in the draft Recovery Plan (USFWS 2003).

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. 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.

As discussed above, a mix of commercial and residential development characterizes the action area for this project. Recent and proposed projects indicate that these types of developments are continuing within the action area. The current landscape in the vicinity of the proposed project has few large areas of undisturbed, natural desert, and connected pathways of habitat are limited. Specifically, only two habitat connectors exist into and out of the pygmy-owl home range affected by this project. This project occurs within one of the connectors, and an approximately 15-acre, high-density residential development, Polanca, is proposed for the other. Existing conditions within the action area are characterized by natural open space constrained by existing and proposed development. As a result, any substantial loss of or impacts to these remaining areas of natural desert are likely to have significant impacts on the ability of pygmy-owls to persist in northwest Tucson. Observations indicate that pygmy-owl movements in this area are tied to these remaining open areas. Impacts significantly reducing the ability of pygmy-owls to utilize these remaining open areas will result in substantially reduced opportunities for pair formation and breeding. However, an influx of pygmy-owls from adjacent areas or population augmentation is needed before these open space areas are likely to be used.

In 2003, only a small population of pygmy-owls (three adult males) was known in the action area. These same three pygmy-owls are the only pygmy-owls confirmed in northwest Tucson in 2004. The project site falls within the home range of one of these known pygmy-owls. This adult male pygmy-owl has inhabited a low-density residential area across Thornydale Road, west of the project site, for at least four years. This bird has been telemetered and over 100 telemetry locations have been recorded, none of which are on the project site. No habitat known to be used by this owl, based on telemetry monitoring, will be directly affected by the proposed action, however, these telemetry data are focused during the pygmy-owl breeding season when use within the home range is contracted. In addition, this particular male pygmy-owl is the oldest pygmy-owl of which we are aware, and it is likely approaching the end of its life (five years is the maximum documented lifespan for pygmy-owls (Proudfoot, pers. comm.)).

Absent dispersal of female pygmy-owl(s) or population augmentation by wildlife managers, pygmy-owls in CHU-3 may be extirpated in the near future. This emphasizes the need to facilitate the immigration of pygmy-owls into the action area to breed. The project vicinity has a history of consistent use by pygmy-owls. The most productive pair of pygmy-owls documented in Arizona to date occupied a site approximately one mile northwest of this project, from 1995 through 1999. The currently occupied home range affected by this project has been occupied since 2000. A female pygmy-owl did disperse into this home range in 2001, but was predated by a cat. Another nest site, which produced young as recently as 2002, is located within a mile of

the project. This particular nest site is currently unoccupied. Four additional historical nest sites are located within three miles of the project site. The other two currently occupied sites fall within three miles of the project, as well. Documented juvenile dispersal pathways are located adjacent to the project, north of Cortaro Farms Road, north and west of the project. Dispersing juveniles were tracked using these pathways in 1997, 1998, 1999, 2000, and 2001.

From 1999 to 2002, the area intersected by and overlapping the action area 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). However, large areas of the State were not surveyed during that time period, so the actual portion of the population represented in northwest Tucson is unknown. Nevertheless, 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 provide an important element and opportunity for the survival and recovery of the pygmy-owl statewide. Survival, as defined in the section 7 handbook, is dependant upon: 1) sufficient population; 2) all necessary age classes; 3) genetic heterogeneity; and 4) sexually mature individuals producing offspring, all in an environment that provides all requirements for completion of the species' life cycle, including reproduction, sustenance, and shelter. The maintenance of subpopulations in the northern portions of the DPS' range may be necessary for recovery, but such maintenance will be dependent on the influx of additional pygmy-owls into northwest Tucson, as well as a regional array of adequate habitat to support multiple breeding pairs. Recovery is defined as the improvement of the status of a listed species to the point where listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act (50CFR§402.02).

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

Residential and commercial housing proposed for this project will result in the net, permanent loss of 25 acres (63% of the 39.9-acre project site) of Sonoran desertscrub vegetation which is suitable as 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 by reducing the undisturbed portions of the site by 63% and leaving open space as a single contiguous parcel. The entire project site contains suitable habitat for the pygmy-owl, and it could provide for each of its life history components.

The action area is within the Northwest Tucson and Tortolita Fan SMAs identified in the draft Recovery Plan. The Recovery Team recommends that areas within SMAs be conserved in a manner that promotes the successful breeding and dispersal of pygmy-owls. The specifics of how that is to be accomplished should rely upon the best available scientific data. Currently, the best information regarding the amount of development occurring in successfully breeding 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. It is clear that we do not yet have adequate information to fully understand the effects of development on pygmy-owls.

However, the AGFD analysis represents the best information upon which we can currently base our analysis.

As mentioned earlier, this project falls within a currently occupied pygmy-owl home range. Between 50% and 60% of this home range has already been disturbed (Westland 2002). Given the proposed project disturbance of approximately 63%, the overall disturbance within the home range will increase and may further affect the ability of this home range to support breeding.

Potentially inadequate breeding habitat within this home range is of concern. However, of even greater concern is maintaining adequate habitat connectivity that would allow a female pygmy-owl to disperse into the home range so that pairing and breeding can occur. We know that, under the current conditions, it is possible for a female to move into the home range. In the fall of 2001, a juvenile female from another nest in northwest Tucson dispersed into this home range and paired with this male. Unfortunately, this female was killed shortly after pairing, most likely by a cat.

Effects from this project that would reduce or eliminate the ability of a female disperser to pair with the male of this home range affects this male's ability to carry out normal breeding behavior. Reproductive output from successful breeding by this male would contribute to the persistence of the pygmy-owl in Arizona. First, offspring produced at this site would provide dispersing pygmy-owls that would contribute directly to maintaining pygmy-owls in northwest Tucson. The number of breeding pairs of pygmy-owls in northwest Tucson, as well as total numbers of pygmy-owls in this area, has declined since 1996, when intensive pygmy-owl surveys and monitoring were initiated. Renewed breeding and an increase in the number of breeding pairs within this subpopulation are necessary for their persistence. Second, pygmy-owl offspring produced in northwest Tucson have been documented dispersing into adjacent pygmy-owl groups. On a landscape scale, pygmy-owls produced in northwest Tucson are needed to provide support to adjacent pygmy-owl groups and subpopulations to bolster population numbers and provide genetic interchange as discussed in greater detail in the Status of the Species section of this BO. However, the possibility of a female dispersing into this area is very low given the current status of the pygmy-owls in Arizona. Therefore the effects on dispersal associated with this project are unlikely to be realized until population increases occur and, therefore, will probably not occur within the lifetime of the resident male pygmy-owl.

Pygmy-owls are capable flyers, but rarely make flights greater than 40 meters (120 feet) (AGFD 2003). Typical flight patterns are more likely to be from one tree to another nearby tree, avoiding long flights in open areas, presumably to avoid exposure to predation (AGFD 2003). However, increased opening size (i.e., gaps between trees or large shrubs), coupled with increased threats (e.g., moderate to high traffic volumes and other human disturbances) are thought to restrict pygmy-owl movement. Recent dispersal data (2004) indicate that a pygmy-owl dispersed over open areas, such as creosote flats, that were previously thought to act as impediments to dispersers. Additional information is needed regarding dispersal habitat for pygmy-owls.

Wide roadways and associated clear zones cause large gaps between tree canopies on either side of roadways and may result in lower flight patterns over roads. This low flight level may result in pygmy-owls flying directly into the pathway of oncoming cars and trucks. Observations of a

pygmy-owl flying across wide roadways by consultants to the Tohono O'odham Nation indicate that they can adjust their flight pattern in response to roads – flying high and straight without the characteristic swoop. Measures can be implemented in roadway design to minimize these threats and allow successful movement across roadways. Among other measures, decreasing the canopy openings between trees on either side of roads and increasing the density of trees along roadways to provide greater shelter and cover from predators and human activities can be utilized to minimize adverse effects to pygmy-owls attempting to cross roads. Improvements to Thornydale Road on the western boundary of the Cortaro Crossings project specifically incorporated design features intended to improve the potential for pygmy-owls to move across Thornydale Road and through the Cortaro Crossings project area. Specific research is needed to determine the distance at which road and clear zone widths significantly affect successful pygmy-owl movement, types of vegetation needed, roadway and landscaping designs, speed limits, etc.

The Cortaro Crossings project will result in impacts to potential pygmy-owl dispersal habitat. Approximately 25 acres of this potential dispersal habitat will be removed. In an effort to reduce impacts to the potential for pygmy-owls to move through the project site and vicinity, and to partially offset adverse effects of the removal of breeding and dispersal habitat on the project site, conserved open space and habitat restoration areas have been incorporated into the project description. This conserved open space and the restoration areas combined will provide approximately 14.9 acres of habitat, primarily along wash corridors extending between and through development. While natural open space capable of supporting pygmy-owl dispersal will remain within the project, the value of this open space for dispersal will be reduced. High intensity human activities will occur immediately adjacent to both sides of the remaining vegetation corridor. This level of human activity will exceed levels typically found in areas utilized by dispersing pygmy-owls and it is anticipated that such activities may reduce, but not preclude, use of the corridor for dispersal. Because of the on-site impacts to dispersal habitat, pygmy-owls with an opportunity for dispersal through the site will effectively be funneled into the narrow open space corridor through the middle of this project. This concentration of pygmy-owl activity presents several concerns. Lighting, noise, and other human activities from existing commercial and residential development adjacent to this project and from the proposed development will occur in close proximity to available dispersal habitat and, along with reduction in width, will reduce its suitability for dispersal. Residents of Cortaro Crossings will utilize the open space corridor for purposes such as walking and playing. While measures will be incorporated to minimize these effects, they cannot be completely avoided. Concentrating potential pygmy-owl use into a narrow corridor has the potential to increase predation. This is particularly true given the expected increase in domestic pets, particularly cats, associated with residential development (see discussion under Environmental Baseline). Urban-adapted predators such as great horned owls, Cooper's hawks, and screech owls can adapt to post-construction site conditions and the potential risk of predation to pygmy-owls may increase due to concentrated pygmy-owl habitat within the project.

The BA discusses two areas in northwest Tucson, similar to the situation that will be created by Cortaro Crossings, which have been utilized by dispersing pygmy-owls. However, the situations are not completely comparable. It is a generally accepted axiom of conservation biology that the longer a corridor is, the wider it needs to be to maintain function (Noss et al. 1997, Harrison 1992). The proposed corridor for Cortaro Crossings is approximately 1,900 feet long. It is

approximately 115 feet wide at its narrowest point and is about 500 feet wide at the widest point, and averages approximately 239 feet. The Hardy Wash corridor mentioned in the BA is approximately 2500 feet long, but it is much wider. The widest point is approximately 560 feet and the narrowest portion is 275 feet wide, and has an average width of approximately 412 feet. In both cases, the corridor is relatively long, but the width of the Hardy Wash corridor averages nearly 200 feet wider. The Shannon Road corridor discussed in the BA has a total width similar to much of the corridor at Cortaro Crossings, approximately 110 feet, but it has a total length of approximately 720 feet, much shorter than the proposed corridor for this project. If you applied the ratio of width to length for the two corridors used by dispersing pygmy-owls to the corridor at Cortaro Crossings, the average width of the proposed corridor would need to be between 270 feet and 310 feet to be expected to function as effectively.

The discussion above is limited by sample size. The sample of documented pygmy-owl dispersal movements through confined corridors is extremely small, and statistically valid inferences are not possible. Notwithstanding the limitations of the data, the importance of this discussion is to point out that the proposed open space corridor for Cortaro Crossings is relatively long and narrow and may not be directly comparable to the corridors where pygmy-owl dispersal has been observed. As such, the development of this project is likely to affect the potential for pygmy-owls to utilize the corridor, and that, in turn, affects the likelihood that a female pygmy-owl could access the resident male pygmy-owl's home range. There is little doubt that, when taking into account the vegetation removal and indirect effects of lights, human activity, and feral animals, the area will be less conducive to pygmy-owl movements than it was prior to development. However, we lack sufficient data to conclusively argue whether the remaining array of habitat within Cortaro Crossings will, or will not, support pygmy-owl movement. Absent an influx of individuals from other areas of the range, this project may not substantially affect the survival of the pygmy-owl within CHU-3 due to the low probability of reproduction and dispersal in an already-reduced population.

If pygmy-owls were to use the open space within the Cortaro Crossing project development, there are a number of potential indirect effects on pygmy-owls that could result from the development of this project. For example, mortality risks associated with pest control, pollution, collisions with cars 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 by approximately 76 (see discussion under Baseline), 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, adversely affecting potential for the proposed open space to support dispersing and nesting pygmy-owls when compared to its existing condition and configuration.

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 suggest two potential adverse effects on the pygmy-owl from cats. 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 establish CC&Rs related to domestic cats. This CC&R will preclude domestic cat owners from allowing their domestic cats to become feral or roam the property without supervision. We anticipate that this will minimize the risk of pygmy-owl mortality from house cats, though it will not eliminate it.

Roads present a mortality hazard to foraging and dispersing pygmy-owls. Roads can disrupt the tree-to-tree flight pattern of the pygmy-owl; a road's width may discourage a pygmy-owl from crossing, or pygmy-owls that do cross may be struck by passing automobiles. While retaining roads in a narrow state or incorporating vegetated medians into a wider road improve connectivity, the risk of vehicle mortality can never be eliminated. The project can reasonably be expected to add to the number of vehicle trips per day than currently occurs in the action area. We estimate that this project will result in an increase of at least 668 additional trips per day within the action area (see discussion in Baseline). 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 Manana, Thornydale, and other major roadways in CHU-3 traverse 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.

Changes in surficial hydrology within and downstream of the project area is an indirect effect of the proposed action. These effects are described in detail in the Environmental Baseline section of this BO. While, in general, the effects of 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 habitat changes to fluvial and interfluvial areas on the Tortolita Fan in

CHU-3. However, the proposed project is in an urbanized portion of the NW Tucson SMA that does not contain active alluvial fan surfaces. The surfaces in this area are estimated by Arizona Geologic Survey to be approximately 100,000 years old.<sup>3</sup> Thus, this project will not adversely affect any active alluvial fan surface. In addition, downstream effects are mitigated by the existing culverted crossing considered in the Thornydale Road consultation and the presence of retention basins within the development that will keep peak flows at their predevelopment condition.

The 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 artificial lighting such as light poles or other permanent lighting fixtures are prohibited in the natural open space. However, adjacent lighting from the commercial and residential areas may still contribute to lighting effects.

The proposed action could also cause short-term noise disturbance associated with construction and long-term noise disturbance and increased human activity. In the event a pygmy-owl is present on-site, 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 and the BA 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 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 will be prohibited). Because these activities are restricted within conserved open space corridors, effects to pygmy-owls will be reduced.

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<sup>3</sup> McKittrick, MaryAnne. 1988. Surficial Geologic Maps of Tucson Metropolitan Area. Arizona Geologic Survey Open File Report 88-18.

## **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 Cortaro Crossings project will make incremental contributions to increased traffic and the need for future road improvements. These future actions are interrelated effects of 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 the 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 25 acres within the project boundaries. This equals approximately 0.03% of the gross acreage within CHU-3. However, the actual percentage of critical habitat removed is somewhat higher since only a portion of the unit contains primary constituent elements and is, therefore, considered critical habitat (USFWS 2002).

Regardless of the quantity of habitat to be altered, the location of this project and the associated habitat impacts are consequential because they occur within an area that may be used by the resident pygmy-owl and affect dispersal pathways into this home range. 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.”

Effects to Features That Were the Basis for Determining the Habitat to be Critical - The primary constituent elements of proposed pygmy-owl critical habitat (USFWS 2002) will be affected by the Cortaro Crossings project. The following is a discussion of the specific effects:

- Primary Constituent Element 2 (existence of or potential for nesting cavities) - Potential pygmy-owl nest substrates, including large trees greater than six inches trunk diameter and saguaros, will be removed from approximately 25 acres (63%) of the project site. While some of these potential nest sites will be preserved on-site or replaced, there will still be an overall reduction in potential nest sites. However, we have no data that nesting substrates are limited within this resident pygmy-owl's home range.
- Primary Constituent Element 3 (vegetation structural diversity) - The vegetation within the project boundaries is characterized by relatively high structural diversity. Natural

vegetation will be completely removed from approximately 25 acres (63%) of the project site. Natural open space and restored habitat will be retained on 14.9 acres of the project, but multi-layered vegetation within these areas will be confined to linear corridors rather than throughout the entire project site, as is currently the condition. This primary constituent element contributes to the potential for a site to provide for the natural history needs of the pygmy-owl related to breeding and, to a lesser extent, dispersal. Known pygmy-owl breeding home ranges include between 46% and 84% natural open space in an assumed 280-acre circular home range. Thirty-seven percent of this approximately 39.9-acre site will remain as natural open space. The entire home range will be reduced from approximately 40% to approximately 31% natural open space.

- Primary Constituent Element 4 (presence of canopy cover) - Because the Applicant will maintain the major wash within the project boundaries as natural open space, many of the large trees providing canopy cover will remain on-site. However, many large trees are also located outside of the proposed open space corridors and will be removed on 25 acres of the project site. This primary constituent element relates to a site providing adequate cover for pygmy-owl movements, primarily dispersal, but also movement within an established home range for foraging and predator avoidance. Because this project will remove important canopy and mid-story vegetation on 25 acres, the ability of this site to support pygmy-owl movements is reduced to those acres of canopy cover within the protected natural open space.
- Primary Constituent Element 5 (configuration and human activity) - Retaining the function of proposed pygmy-owl critical habitat is not attributed solely to the quantity of habitat remaining on a site. The configuration of that habitat must also be considered. Connectivity must be maintained in order to preserve function. The presence of high levels of human activities adjacent to open space can also affect the potential for conserved open space to function as pygmy-owl habitat. As discussed above, the Cortaro Crossings project, which is in an urbanized portion of CHU-3, will further restrict natural open space to a corridor bounded by high-density residential and commercial development. This corridor does provide the potential for connectivity through the site; however, the functionality of the proposed corridor may be impacted by the proximity of high levels of human activities. Residents of Cortaro Crossings will utilize the open space corridor for passive recreation. Although the site is currently used by adjacent landowners to walk their pets and for other recreational pursuits, increasing the number of people in this area by 118 households and commercial uses can reasonably be expected to elevate the use above current levels.

As mentioned above, the draft pygmy-owl recovery plan discusses the importance of the northwest Tucson area to the recovery of the Arizona DPS. We acknowledge that this document is draft, and that there is no legal requirement to follow its recommendations. However, it does represent the best information available regarding what is recommended for recovery of the pygmy-owl. The draft was developed by a group of professional biologists and reviewed by a broad-based implementation group. The draft recovery plan states, "Based on the number of CFPOs [pygmy-owls] found in RA [Recovery Area] 3 [northwest Tucson and southern Pinal County] (29% to 44% of the known Arizona CFPO population since 1998) and their

productivity, we feel the segment of the CFPO population found in RA 3 is essential to the survival and recovery of the overall CFPO population in Arizona" (USFWS 2003). The draft recovery plan further indicates that, regarding the northwest Tucson area: 1) careful evaluation of activities proposed in the area is needed due to the amount of existing habitat alteration and the immediate threats to pygmy-owl breeding and dispersal habitat; 2) the area contributes to pygmy-owl recovery by providing breeding habitat and connectivity to other recovery areas; 3) the area is designated as a Special Management area because of its increased significance to recovery; 4) the area should be subject to no ground disturbance which would preclude the ability of pygmy-owls to meet their life history requirements; and 5) is important for recruitment and recovery because it contains unoccupied pygmy-owl habitat in proximity to known nests (USFWS 2003).

The Cortaro Crossings project occurs in an area that has experienced extensive residential and commercial development. As a result, the amount and configuration of remaining natural open space is reduced and fragmented. This project occurs within the occupied home range of an unpaired male pygmy-owl. Because of the extent of existing urban development, only two open space corridors remain that connect this male's home range to less urban portions of CHU-3. A high-density residential project, Polanco, has submitted a development plan for the western corridor entering this home range. We have not entered into discussions with the proponents of the Polanco development, but we have provided them with a letter identifying the potential issues and offering our assistance to address the issues. We will use all means within the scope of our authority to resolve those issues and maintain habitat connectivity in the western corridor. Following construction of the Cortaro Crossings project, this remaining habitat connector will be of utmost importance to the viability of this existing pygmy-owl home range. Cortaro Crossings is located in the eastern corridor. As a result of these two projects, habitat connectivity into this home range will be diminished, but not precluded. In light of the current population status of the pygmy-owl in CHU-3, there is a probability that these habitat connectors will be used by dispersing or resident pygmy-owls, reducing the potential for effects on the survival of the pygmy-owl. However, effects to the recovery of the pygmy-owl will occur in the form reduced connectivity, loss of nesting habitat, and reduced potential for the resident pygmy-owl to pair and reproduce.

In the face of a diminished baseline for both remaining pygmy-owl habitat and the number of remaining pygmy-owls, it is important to maintain the eastern habitat connector into this occupied home range in order to promote survival and retain recovery options. As described above, Cortaro Crossings will affect four of the five primary constituent elements identified in the pygmy-owl critical habitat proposed rule. Telemetry monitoring does not show that any of the habitat impacted by this project has been used by the resident pygmy-owl, however, the data are incomplete because telemetry monitoring has occurred primarily during the breeding season, when the use area is smallest. There is a low probability that female dispersers will enter this area during the lifetime of this particular male pygmy-owl, which is four years old. As a result, effects to dispersal and nesting habitat have a low likelihood of occurrence. However, as outlined in the draft pygmy-owl recovery plan, the northwest Tucson SMA and this resident owl are important for recovery. As stated in the section of the plan discussing the High Conservation Value Area in the Northwest Tucson SMA, "Because this area supports a high-density of nesting [pygmy-owls] and because dispersal pathways are limited within RA 3 (the remaining suitable

dispersal corridors are used consistently on an annual basis), it is imperative to protect the remaining areas of native desert. Without such protection, it may become impossible for new owls (e.g. dispersing juveniles) to move into this area to replace owls lost to mortality or other factors, or for resident owls (both adults and fledglings) to move out of the area. The movement of [pygmy-owls] within and among [recovery areas] is essential to achieving the recovery criteria related to the distribution of the [pygmy-owl] population in Arizona (USFWS 2003).

## 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 capable of supporting pygmy-owls. 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. Task 2.0 of the draft pygmy-owl recovery plans states, "Protect all currently known (since 1993) [pygmy-owls] in Arizona and the habitat they occupy. Identify and maintain an interconnected system of habitat extending from the northern portion of the historical range, south to areas potentially occupied by [pygmy-owl] populations in Mexico (USFWS 2003)". The Northwest Tucson and Tortolita Fan SMAs historically accounted 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 to be implemented as a part of this project are intended to maintain the ability of the resident and dispersing pygmy-owls to move within CHU 3.

## Effects to Survival

Survival is defined in the Consultation Handbook as the species' persistence as a listed or recovery unit, with sufficient resilience to allow for the potential recovery from endangerment. (USFWS 1998). Persistence is not just the maintenance of existing pygmy-owls, but also the occurrence of ongoing reproduction to replace those lost to mortality, thus maintaining the potential for recovery. Cortaro Crossings will affect the persistence of this species in the Arizona DPS and Recovery Area 3 as follows:

- Twenty-five acres of suitable nesting and dispersal habitat will be lost (63% of the project area and about 9% of the 280-acre home range), affecting the potential for this home range to support breeding; and reduce connectivity into the home range. Although relatively small in size, this loss of habitat occurs within an occupied home range and in proximity to known pygmy-owl dispersal corridors. The significance of the effects are not related to size, but rather, location. The Applicant will retain and enhance 14.9 acres of on-site open space, including the wash systems, for the conservation of the pygmy-owl. A management plan was developed to facilitate the long-term conservation of habitat values within the remaining open space.
- This project will increase the number of vehicles and vehicle trips in the action area. This will contribute to an increase in the potential for direct mortality (vehicle strikes), but also affect

dispersal, and the potential for pairing and reproduction, through increased traffic and road widths. The Applicant has proposed vegetation buffers along the roadways adjacent to the project to reduce flight distances and maintain habitat connectivity.

- This project will add approximately 118 households and a commercial area. The increased human activity, lights, toxins, etc. associated with this increase in the human population will affect the viability of the remaining habitat within the project area. This increased human activity increases the potential for mortality and reduces the likelihood for dispersal into this home range. The Applicant developed a management plan that will help to reduce these impacts within the project area.
- Pygmy-owl predators in the form of urban-adapted wildlife and domestic pets will increase as a result of this project, increasing the potential for predation. The Applicant has proposed restrictions on free-ranging domestic pets.
- Development of the project will affect the main wash running through this pygmy-owl home range. Washes support important habitat for pygmy-owls, particularly for movement and dispersal, due to enhanced vegetation density, structure, and diversity. The Applicant will utilize detention basins to maintain the hydrology of this wash system.

In 2004, a total of 20 adult pygmy-owls were documented within the Arizona DPS (excluding the Tohono O'odham Nation). Of these 20, three are documented within Recovery Area 3 (which also corresponds to CHU 3). This project will directly affect 5%, and indirectly affect 15%, of the currently known pygmy-owl population in the Arizona DPS. Within RA 3, 33% of the known pygmy-owls will be directly affected, and 100% indirectly affected. However, the one pygmy-owl directly affected by this project is four-years old, and its ability to contribute to the survival of the Arizona DPS may not be realized within its lifetime.

#### Effects to Recovery

While survival is concerned only with persistence of the species, recovery is defined as an improvement of the population status to the point that the protections of the Act are no longer necessary (USFWS 1998). In order for the population status of the Arizona pygmy-owl DPS to improve, population numbers must be increased and adequate habitat must be conserved to support an increased number of pygmy-owls and their movements and dispersal.

The effects of this project on recovery can be assessed by comparing the effects of the project to the recovery criteria outlined in the draft pygmy-owl recovery plan (USFWS 2003). As mentioned previously, there is not a final recovery plan for the pygmy-owl, and there is no legal obligation to adhere to the draft plan. However, the draft plan does represent the best information currently available with regard to pygmy-owl recovery. If the northwest Tucson pygmy-owl population is to recover, however, it will require comprehensive planning efforts such as those now underway in Pima County and the cities of Tucson and Marana. We do not believe the loss of 25 acres will appreciably affect the potential success of these efforts.

Recovery Criterion 1 - The [pygmy-owl] population either reaches a size or achieves a rate of increase that insures a high-probability of persisting over the long-term: There is currently not enough demographic information available to develop any sort of reliable population target for recovery. However, the apparent decline in overall numbers and nest sites, coupled with only 20 known adult pygmy-owls, indicates that Recovery Criterion 1 has not been satisfied. Cortaro Crossings will directly or indirectly affect 15% of the known adult pygmy-owls within the Arizona DPS (excluding the Tohono O'odham Nation). The effects of this project will reduce the potential for pairing and reproduction of existing pygmy-owls in the northern portion of the DPS, limiting the rate of increase in this area.

Recovery Criterion 2 - [Pygmy-owls] are successfully reproducing within Recovery Areas where appropriate habitat patches exist, and movement of individual [pygmy-owls] between population segments (i.e. Recovery Areas) within Arizona, and between Arizona and Mexico, is possible based on the availability of habitat and the capabilities of dispersing pygmy-owls: The Cortaro Crossings project may affect, but should not preclude, the ability of the known pygmy-owls in northwest Tucson to successfully reproduce by reducing the potential for a dispersing female pygmy-owl to enter existing home ranges, particularly the home range within which this project occurs. Movement and dispersal will be affected by loss of habitat, reduction in habitat connectivity, increased traffic, and the potential increase in predation.

Recovery Criterion 3 - Threats to the persistence of [pygmy-owls] have been successfully reduced or eliminated within Recovery Areas, so that the [pygmy-owl] is no longer in danger of extirpation over all, or a significant portion, of its range in Arizona: The Applicant has included measures to reduce the effects of this particular project on the pygmy-owl, but the project will still affect pygmy-owls. In addition, the large-scale conservation planning efforts currently underway may reduce the significance of the effects of the Cortaro Crossings project, although these efforts are not completed, and may not be completed within the lifetimes of the existing pygmy-owls. The threats to the persistence of the pygmy-owl in Recovery Area 3 exist at essentially the same level as when the draft plan was completed.

## Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private non-Federal actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. 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. State, local, and private actions are expected to continue with various levels of development in the immediate vicinity of the project site and elsewhere in the action area. Activities occurring within jurisdictional waters of the U.S. require a section 404 permit under the CWA from the ACOE and, as a result, would be subject to future section 7 consultation and are not considered under cumulative effects. It must be noted that some project proponents may choose to avoid jurisdictional waters by bridging over or jack-and-boring under them. This would preclude the need for a 404 permit, thus removing the project's Federal nexus.

Some of these projects may address effects on pygmy-owls through another process (e.g. Habitat Conservation Planning under section 10 of the ESA) and could be excluded from this cumulative effects analysis, but such participation is voluntary. Aside from HCPs already in development, it is impossible to predict which parcels may choose to pursue an HCP.

The action area has been subject to significant development activities, and development will likely continue at some level. There have been a number of recent lower-density developments proposed, such as Butterfly Mountain and Saguaro Canyon Ranch. In addition, some development projects have chosen to cluster development at higher densities, leaving larger blocks of undisturbed desert and wash vegetation (Dove Mountain and Skyranch). 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 with low-density zoning that was rezoned to a higher density. Based on projects with which we are familiar, this trend is likely to continue, but probably to a reduced extent.

The Environmental Baseline describes an action area that is already developed and fragmented. As a result, virtually all potential pygmy-owl habitat south of the project has been lost, and any additional loss or fragmentation of pygmy-owl habitat north of the project 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 north and west 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, the project area, action area, and surrounding region have supported one of the highest documented concentrations of pygmy-owls in Arizona. We are aware of a number of potential residential and commercial developments, schools, churches, etc. in the action area that may further reduce and fragment pygmy-owl habitat in this area. Some of these projects may not be reasonably certain to occur based on our section 7 guidelines, but the development history of this area, submitted plats and development plans, and apparent trends indicate that there is a likelihood that they will.

Our analyses of trends in growth (see Environmental Baseline) frame the possible extent 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, designation of impact fee areas, rezoning requests, development plans, plat submittals, and grading and building permit applications and approvals. It may be reasonably assumed that these actions, when considered in the context of recent trends, give us a clear picture of the potential for cumulative effects that are reasonably certain to occur.

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 Manana 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 that indicate continued development is reasonably certain to occur. We have searched the land use and zoning designation 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-owl habitat, without a Federal nexus, are reasonably certain to occur at the following areas: Cortaro Road/Thornydale Road intersection (the Safeway Property, Polanco), Tangerine Road/Thornydale Road intersection (Tortolita Vistas), Hardy Road/Thornydale Road intersection (Hardydale II, Backus parcel), Heritage Highlands development area, Tangerine Road/Camino de Oeste area, Camino de Manana/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.

Specifically, development plans or plat submittals indicate that there are five projects within a mile of Cortaro Crossings that are likely to occur in the near future. These projects range from 1 acre to 20 acres in size. Because these projects will likely avoid jurisdictional washes, based on

size or development plans, it is unlikely that there will be a Federal nexus. However, because the locations of these projects are in key dispersal pathways and support potential breeding habitat, effects to the pygmy-owl may occur. Of particular concern is the proposed Polanco development. This high-density residential development would mass-grade approximately 15 acres within the remaining western habitat connector for the occupied pygmy-owl home range. This would essentially remove this habitat connector. In addition to Cortaro Crossings and also within eastern habitat connector, Safeway Corporation recently sold approximately 12 acres immediately northwest of Cortaro Crossings at the northeast corner of Cortaro Farms Road and Thornydale Road to a developer. Development plans have been submitted for this parcel. Currently undeveloped parcels within the southern and southeastern portions of this pygmy-owl's home range also have development plans submitted. These cumulative effects, when considered with the impacts associated with Cortaro Crossings, reduce the likelihood that this pygmy-owl can persist and successfully attract a mate. However, considering the current status of the population in northwest Tucson, these effects are improbable, absent active augmentation efforts or a female pygmy-owl dispersing to this site in this male's lifetime.

Tangerine Crossing, a development currently under review in the Town of Marana and approximately 4.5 miles north of this project, will cover approximately 300 acres and is located adjacent to Skyranch. We do not know whether there will be a Federal nexus, what effects this project may have on pygmy-owls and critical habitat, nor what contributions this project may make toward conserving the pygmy-owl within the action area. In this same area, the Tortolita Vistas project, approximately 200 acres, is going through the approval process with the Town of Marana. Indications are that there is no Federal nexus and that development will occur on 40% of the parcel.

These cumulative effects will result in additional habitat fragmentation because most occur adjacent to roadways and will increase the linear extent of unsuitable habitat within the action area. The areas of CHU-3 where we anticipate cumulative effects to occur support known breeding home ranges for the pygmy-owl, as well as dispersal habitat and pathways. As a consequence, the total area of available pygmy-owl breeding habitat, habitat connectivity, and the opportunity for pygmy-owl movements throughout CHU-3 will be reduced. Because some of these non-Federal projects occur immediately adjacent to Cortaro Crossings, the cumulative effects will compound the effects from the project. However, because the current population of pygmy-owls is so reduced, there is a low probability that effects to dispersal and nesting will occur within this male pygmy-owl's lifetime.

## 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, while the proposed action will impact pygmy-owls in northwest Tucson, it is not likely to jeopardize the continued existence of the pygmy-owl. This project also occurs within proposed critical habitat for the pygmy-owl. It is our conference opinion that the proposed development is not likely to result in the destruction and adverse modification of proposed critical habitat. These conclusions are based on the site-specific information of this consultation. Each future consultation must use the site-specific information available at that time and reflect the status of the pygmy-owl at that time. 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, outside the Tohono O'odham Nation, was three and four, respectively, down from the highest number, 13, documented in 2001. Although sample size is low, and the monitoring period is relatively short, there appears to be a declining trend in population that has somewhat corresponded with recent drought conditions. Observations by researchers in Mexico may indicate a similar population decline just south of the U.S./Mexico border (A. Flesch, pers. comm). 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, numbers of known pygmy-owls within CHU-3 have declined from a high of 11 in 2000 to only 3 in 2004, indicating that other factors are likely contributing to the decline. Specifically, all three remaining pygmy-owls in CHU-3 are males. It is imperative that habitat connectivity is maintained and enhanced, or that population augmentation be implemented, in order to increase the number of breeding pairs and reproductive output.
- Portions of CHU-3, including the action area, have 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 containing some portions of CHU-3, had 310% growth during that same time period. Not all of this growth occurred in areas affecting the pygmy-owl, but much of it did. 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 CHU-3 are slated for expansion or improvement, and at least one new highway interchange is being planned. Currently, only small, isolated parcels of natural open space remain within much of the action area in contrast to the larger expanses of open space in northern portions of CHU-3. Pygmy-owl dispersal pathways in northwest Tucson appear to be limited to remaining open space and low-density subdivisions where the majority of known pygmy-owl nest sites are located. Some sites within the action area have been designated for pygmy-owl conservation as a result of completed section 7 consultations.

- With the 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. Specifically, the Polanco residential development is proposed and moving forward within the area of the remaining western habitat link into this occupied home range. Development plans have been submitted for parcels adjacent to Cortaro Crossing to the northwest, southwest, and south. Areas where these cumulative effects are anticipated to occur include areas where pygmy-owl breeding home ranges and dispersal pathways have been documented. Some of these effects are reduced due to the recent trend to plan and construct lower density housing. However, most of the projects in proximity to Cortaro Crossing are high-density or commercial projects. These cumulative effects compound the effects from the Cortaro Crossings project on both breeding and dispersal habitat, and are likely to continue to remove and further fragment pygmy-owl habitat.
- The Applicant has included a number of conservation measures in an attempt to reduce the effects of the proposed action on pygmy-owls by 1) providing contingencies to minimize effects on any additional pygmy-owls that may be detected on the project site prior to and/or after commencement of construction; 2) minimizing the indirect effects of this development (pet predation, pesticides, lighting, inappropriate activities within the conserved open space, etc.) on pygmy-owls; 3) leaving 37% of the project site as natural open space; 4) maintaining habitat connectivity by leaving the washes in a natural state; and 5) revegetating areas within the proposed corridor to further enhance their suitability for pygmy-owl.

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 will occur within a pygmy-owl home range that has already experienced extensive habitat loss and fragmentation. Habitat disturbance resulting from this project will occur on 25 acres (63% of the 39.9-acre project site and 9% of the circular 280-acre home range). The project will conserve 14.9 acres of enhanced and natural open space (37% of the project) as an open space corridor traversing the property. These protected lands will be managed to protect suitable habitat for the pygmy-owl and contribute to its conservation.
2. The open space corridor will be narrower than the current configuration, and the indirect effects of the project will likely reduce functional connectivity in comparison to existing conditions. However, we simply do not know the degree to which this reduced function will affect pygmy-owl dispersal. However, there is no question that function will be reduced when compared to existing conditions.
3. This project will result in effects to the pygmy-owl. However, in this particular case, the significance of these effects related to survival and recovery of the species is decreased by the existing condition of this home range and the low likelihood of female dispersal

during this resident male pygmy-owl's lifetime. Due to the currently low numbers of known dispersing juvenile pygmy-owls statewide, it is also unlikely that a dispersing female pygmy-owl would (a) arrive at and (b) attempt to use this resident male's home range during its lifetime. Once this male is gone, it is unlikely that a new male will select this home range for occupancy due to the existing level of development (the percentage of habitat disturbance already exceeds that documented in successful pygmy-owl breeding home ranges in northwest Tucson). The construction of the Cortaro Crossings project will not change this condition. Therefore, we do not anticipate that this project will affect the long-term survival or recovery of the species within CHU 3 and, therefore, this project will not jeopardize the continued existence of the species and will not destroy or adversely modify proposed critical habitat.

## **INCIDENTAL TAKE STATEMENT**

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

Under the terms of sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

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

In determining if take will occur, we must use the standard set forth in the "Arizona Cattlegrowers" case. The ruling in that case stated that a determination of incidental take requires two findings: that the species is reasonably certain to be present in the action area, and that the action under review is reasonably certain to result in taking of the species. On the first requirement, there is little question that the resident pygmy-owl occupies the action area for this project. However, we have no records, despite over 100 telemetry locations, of the resident bird occurring on the subject property. No habitat known to be used by the owl, based on this telemetry monitoring, will be directly affected by the proposed action, and the indirect effects of vehicle- and cat-owl interactions are possible, but have a low probability of occurring. Thus, while it is possible, based on our current definition of a pygmy-owl home range, that there will be incidental take arising from this action, we cannot say that the proposed action is reasonably certain to result in the direct take of the resident pygmy-owl. Given the effects of this project on connectivity into this pygmy-owl home range, take in the form of impairing or disrupting normal breeding behavior could occur, but is not reasonably certain to occur because of the low probability that a female will attempt to pair with this resident male pygmy-owl during its

lifetime.

Incidental take is not anticipated as a result of the Cortaro Crossings project.

### **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 our Division of Law Enforcement, 2450 West Broadway Road, #113, Mesa, Arizona (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 FWS 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, we 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:

- The ACOE should conduct or fund studies using both monitoring and telemetry, to determine pygmy-owl habitat use patterns and relationships between owls and the human interface in northwest Tucson. Surveys involving simulated or recorded calls of pygmy-owls require an appropriate permit from us. AGFD should also be contacted in regard to state permitting requirements.
- The ACOE should 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.
- The ACOE should assist in the implementation of recovery tasks identified in the pygmy-owl Recovery Plan when approved by us.

- The ACOE should 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 Cortaro Crossings project in Pima County, Arizona. As provided in 50 CFR '402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We have assigned log number 02-21-03-F-0489 to this consultation. Please refer to that number in future correspondence regarding this consultation. Any questions or comments should be directed to Scott Richardson at (520) 670-6150 (x 242) or Sherry Barrett at (520) 670-6150 (x223).

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  
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ  
(Attn. Bob Broscheid)  
Army Corps of Engineers, Phoenix, AZ (Attn: Robert Dummer)  
Pima County Development Services, Tucson, AZ (Attn: Sherry Ruther)  
New World Development, Tucson, AZ (Attn: Jack Richter)  
Westland Resources, Tucson, AZ (Attn: Kevin Barnes)

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