

AESO/SE  
2-21-99-F-198

October 30, 2000

Mr. Mark Plank, Acting Director  
Engineering and Environmental Staff  
United States Department of Agriculture  
Rural Utilities Service  
Washington, D.C. 20250

Dear Mr. Plank:

The Service received the Rural Utilities Service (RUS) May 15, 2000, letter and enclosed biological assessment for the Arizona Electric Power Cooperative, Inc., (AEPCO) proposed Thornydale substation located on a leased (50 years), 10-acre parcel of Arizona State Trust land north of Tangerine Road, Tucson, Arizona, at T11S, R12E, Section 33, SW 1/4, on May 18, 2000. The biological assessment was submitted to the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973, as amended.

Your letter determined this power substation may affect, but is not likely to adversely affect the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) (CFPO) with critical habitat, and the lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*). In your letter, you requested concurrence with your determination, but noted that, should the Service believe this project was more appropriately addressed as a formal consultation, that it be considered for formal consultation. Because the proposed project is in designated CFPO critical habitat and constituent elements are being removed, the Service agrees that formal section 7 consultation is the appropriate process for the proposed project. Formal consultation also changes the original determination from “not likely to adversely affect” the CFPO to “likely to adversely affect”, and the Service has proceeded on that assumption. Ms. Teri McCaulou of AEPCO has acted as your representative in communications and information regarding this proposed project, and has been in contact with the Service.

### **Consultation history**

This biological opinion is based on information provided in AEPCO’s May 15, 2000, biological assessment, meetings and electronic and telephone conversations between Service wildlife biologists (Mike Wrigley and Thetis Gamberg) and AEPCO representative Teri McCaulou, site

investigations, and other sources of information. The Service sent a letter dated September 20, 2000, to RUS, requesting a 60-day extension for the delivery of the final biological opinion, now due on or before November 26, 2000.

References cited in this biological opinion are not a complete list of all available literature on the species of concern, developed sites or substations, associated actions, management and their effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at our Phoenix office.

### **Project description**

The project area is defined as the leased (50 years), 10-acre parcel of Arizona State Trust land north of Tangerine Road, Tucson, Arizona, at T11S, R12E, Section 33, SW 1/4. This area is outside the boundaries of a CFPO-designated Special Management Unit (SMA), but is within CFPO critical habitat.

AEPCO proposes to build a new 46kV/25kV electric power substation on 3.1 acres to meet anticipated short-term (10-year build-out) electrical needs in the area for TRICO Electric Cooperative, Inc., (TRICO) customers (Map and aerial photograph, Appendix B of the BA).

Current growth in this area of Tucson has exceeded the Marana transformer output. AEPCO is currently supplementing that unit's power during peak summer use with generators, but that is a temporary solution. This substation is anticipated to come online by the year 2001. Future growth in this area of Tucson may create the need for more power stations in different locations; however, those projects will require separate section 7 consultation under the Endangered Species Act (Act) of 1973, as amended, and other appropriate actions by other entities. This station is intended to maintain the current electrical needs of the build-out already permitted in the area covered by the Marana transformer stations.

Construction work will occur outside the CFPO breeding season (February 1 to July 31 annually). CFPO critical habitat (3.1 acres) will be developed at this site. Five acres (the highest quality CFPO critical habitat on the site) will be set aside (no future development) in accordance with the Pima County deed restrictions and lease permit stipulations. The remaining 1.9 acres will not be developed or disturbed as part of this project. Per the biological assessment, after the substation is built, future expansion will not be considered at this site for the next 20 years. Should future planning occur for this project area or the remaining 1.9 acres, it, and any other work planned for this site not specifically covered here, will require section 7 consultation.

TRICO is in the process of developing its Construction Work Plan to submit to RUS. TRICO will run four circuits (lines) from the proposed substation that will follow existing distribution lines heading east and west along Tangerine Road. Two additional circuits are available for distribution from the substation, potentially providing a total of six distribution circuits. While the power provided by this substation will satisfy the short-term build-out projections for the area

for the next ten years (a standard practice in power planning), future development in the northwest area of Tucson will depend greatly on zoning, infrastructure, city, state and county regulations, and land ownership status.

The substation will be built on a concrete foundation in a fenced area measuring 200 by 240 feet. This ground disturbance will require AEPCO to re-direct the future flow from one ephemeral wash to a nearby ephemeral wash. The second wash is expected to contain the additional flow and no erosion or sedimentation problems are anticipated by this event. The seven-foot high chain link fence will include a locked gate and three-strand barb wire on top of the fencing. A 150-foot tall communications tower will be free-standing and three-legged. It will include a south-directional antenna to provide remote control and substation monitoring. Planning and use of this and any microwave tower is regulated by the Federal Communications Commission (FCC); it generates a very low power output.

The rocked “apron” (edging) surrounding the site will be kept vegetation-free by appropriate and judicious use of herbicides (see BA, pages 5 and 7). Ingress/egress will use the existing access dirt road from Tangerine Road (see BA, Figure 3, and site map dated June 2, 2000). Hazardous materials (fuel, gas, diesel, oil, herbicide, paint, etc.) will be handled according to Material Safety Data Sheet (MSDS) information and be disposed of properly and legally.

The BA contains further details of the substation construction and accessories (tower, powerlines, access road, apron maintenance, herbicide application, and on-site minimization measures). Figure 3 in the BA shows the site layout. An aerial photograph showing ingress/egress and dated June 2, 2000, is included in the Service’s consultation file. Representative photographs of the site and parcel are in Appendix B of the BA.

The proposed project includes the following actions to maintain and enhance the remaining acres of undeveloped CFPO critical habitat on the site, with transplanted and additional trees and cacti concentrated in the five-acre set-aside area and the natural washes. This area supports many larger ironwood trees. To comply with the Pima County Native Plant Protection Ordinance (NPPO), AEPCO will protect, transplant, or replace any native tree or cacti lost or damaged during construction or ground-disturbing activities. AEPCO will follow the Pima County NPPO Set-Aside Method for ironwood replacement. AEPCO also will:

1. conduct an evaluation of the natural resource value of the ironwoods (on-site);
2. designate a minimum of 30 percent of the site (five acres for this situation) with the highest natural resource value as a set-aside area (permanently protected open space) with no future development;
3. preserve in place or salvage and transplant (on-site) any disturbed ironwood trees;
4. evaluate the transplant feasibility of the ironwoods on-site;
5. set aside five contiguous, on-site acres\* [not to be developed (Figure 3, BA)]; and
6. plant ironwoods (about 90 trees, about two feet tall), that will serve to replace damaged ironwoods and supplement existing CFPO critical habitat in the remaining 6.9 acres.

[\* The five acre set-aside area is located north of Tangerine Road. Tangerine Road has been designated a scenic route by Pima County (zoning ordinance #18.77.040) and a required setback of at least 350 feet is the county minimum. There will be no future development within the five acre set-aside area due to deed restrictions and lease stipulations. Representative photographs of the set-aside area are provided in Appendix C of the BA.]

AEPCO will plant three ironwoods for every one ironwood lost or destroyed and one of every three trees will be a 24 inch (boxed) nursery tree. AEPCO will transplant ironwoods that must be moved during construction, and will also plant two more ironwood trees (on-site) for every ironwood tree transplanted. AEPCO will ensure 100 percent site survivability by replacing dead trees and watering all transplanted and planted trees. AEPCO will replace mesquites at a 1:1 ratio for any mesquites six inches dbh or larger damaged or lost in this project.

AEPCO will also transplant four saguaros out of five that exist on site (the fifth will not survive transplantation as it was damaged by vandals) and plant three additional two-foot or taller saguaros on the remainder of the site.

### **Status of the species**

A detailed description of the life history and ecology of the CFPO may be found in the Birds of North America (Proudfoot and Johnson 2000), Ecology and conservation of the cactus ferruginous pygmy-owl in Arizona (Cartron et al. 2000), and other information available at the Arizona Ecological Services Field Office. Information specific to the CFPO in Arizona is limited. Research in Texas has provided useful insights into the ecology of the subspecies, and in some instances represents the best available information; however, habitat and environmental conditions are somewhat different in Arizona and conclusions based on Texas information is tentative.

### **Species/critical habitat description**

The Service listed the Arizona population of the CFPO as a distinct population segment (DPS) on March 10, 1997, effective April 9, 1997 (USFWS 1997 [62 FR 10730]). The past and present destruction, modification, or curtailment of habitat is the primary reason for the decrease in population levels of the CFPO. On July 12, 1999 we designated approximately 731,712 acres critical habitat supporting riverine, riparian, and upland vegetation in seven critical habitat units, located in Pima, Cochise, Pinal, and Maricopa Counties in Arizona (USFWS 1999 [64 FR 37419]). Only lands containing, or likely to develop, those habitat components that are essential for the primary biological needs of the owl and requiring special management are considered critical habitat. By definition, all areas above 4,000 ft, areas not containing or capable of developing constituent elements (e.g., saguaro, large diameter trees, etc.), existing features and structures (e.g., roads, buildings, etc.) and areas not requiring special management or other areas (e.g., National Parks, Tribal lands, etc.) were excluded and are not critical habitat. The actual

area meeting this definition as defined in the final rule is substantially less than the total area within the exterior boundaries of the area designated.

Areas designated as critical habitat included recent owl locations and areas important for genetic and demographic interchange within the geographical area occupied by the species that are essential to the conservation of the species and requiring special management considerations. These units, containing the primary constituent elements, or the capacity to develop these habitat components are essential for the primary biological needs of this species and include foraging, nesting, rearing of young, roosting, sheltering, and dispersal. Actions that may destroy or adversely modify critical habitat are actions that destroy or alter the primary constituent elements to the extent that the value of critical habitat for both survival and recovery of the species is appreciably diminished. These activities include, but are not limited to: removing vegetation, water diversions or impoundments, ground water pumping, and recreational activities that appreciably degrade habitat.

### **Life history**

CFPOs are small birds, averaging 6.75 inches in length. CFPOs are reddish-brown overall, with a cream-colored belly streaked with reddish-brown. The CFPO is crepuscular/diurnal, with a peak activity period for foraging and other activities at dawn and dusk. During the breeding season, they can often be heard calling throughout the day, but most activity is reported between one hour before sunrise to two hours after sunrise, and late afternoon/early evening from two hours before sunset to one hour after sunset (Collins and Corman 1995).

A variety of vegetation communities are used by CFPOs, such as: riparian woodlands, mesquite “bosques” (Spanish for woodlands), Sonoran desertscrub, and semidesert grassland communities, as well as nonnative vegetation within these communities. While plant species composition differs among these communities, there are certain unifying characteristics such as the presence of vegetation in a fairly dense thicket or woodland, the presence of trees or saguaros large enough to support cavity nesting, and elevations below 4,000 ft. Historically, CFPOs were associated with riparian woodlands in central and southern Arizona. Plants present in these riparian communities include cottonwood, willow (*Salix* spp.) and hackberry (*Celtis* spp.). Cottonwood trees are suitable for cavity nesting, while the density of mid- and lower-story vegetation provides necessary protection from predators and an abundance of prey items for the CFPO. Mesquite bosque communities are dominated by mesquite trees, and are described as mesquite forests due to the density and size of the trees.

Over the past several decades, CFPOs have been primarily found in the Arizona Upland Subdivision of the Sonoran Desert, particularly Sonoran desertscrub (Brown 1994). This community in southern Arizona consists of paloverde, ironwood, mesquite, acacia, bursage (*Ambrosia* spp.), and columnar cacti (Phillips et al. 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnsgard 1988). However, over the past several years, CFPOs have also been found in riparian and xeroriparian habitats and semidesert grasslands as

classified by Brown (1994). Desertscrub communities are characterized by an abundance of saguaros or large trees, and a diversity of plant species and vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. Semidesert grasslands have experienced the invasion of mesquites (*Prosopis velutina*) in uplands and linear woodlands of various tree species along bottoms and washes.

The density of trees and the amount of canopy cover preferred by CFPOs in Arizona is unclear. However, preliminary results from a habitat selection study indicate that nest sites tend to have a higher degree of canopy cover than random sites (Wilcox et al. 2000). For areas outside Arizona, CFPOs are most commonly characterized by semi-open or open woodlands, often in proximity to forests or patches of forests. Where they are found in forested areas, they are typically observed along edges or in openings, rather than deep in the forest itself (Binford 1989, Sick 1993), although this may be a bias of increased visibility. Overall, vegetation density may not be as important as patches of dense vegetation with a developed canopy layer interspersed with open areas. The physical settings and vegetation composition varies across *G. brasilianum*'s range and, while vegetation structure may be more important than composition (Wilcox et al. 1999, Cartron et al. 2000a), higher vegetation diversity is found more often at nest sites than at random sites (Wilcox et al. 2000).

CFPOs typically hunt from perches in trees with dense foliage using a perch-and-wait strategy; therefore, sufficient cover must be present within their home range for them to successfully hunt and survive. Their diverse diet includes birds, lizards, insects, and small mammals (Bendire 1888, Sutton 1951, Sprunt 1955, Earhart and Johnson 1970, Oberholser 1974) and frogs (Proudfoot et al. 1994). The density of annuals and grasses, as well as shrubs, may be important to the CFPO's prey base. Shrubs and large trees also provide protection against aerial predation for juvenile and adult CFPOs and cover from which they may capture prey (Wilcox et al. 2000).

CFPOs are considered non-migratory throughout their range by most authors, and have been reported during the winter months in several locations, including OPCNM (R. Johnson unpubl. data, T. Tibbitts, Organ Pipe Cactus National Monument unpubl. data). CFPOs begin nesting activities in late winter to early spring. In Arizona differences between nest sites may vary by as much as two months [Abbate et al. 1996, S. Richardson, Arizona Game and Fish Department (AGFD) unpubl. data]. As with other avian species, this may be the result of a second brood or a second nesting attempt following an initial failure (Abbate et al. 1996). In Texas, juveniles remained within approximately 165 ft of adults until dispersal. Dispersal distances (straight line) of 20 juveniles monitored from their natal sites to nest sites the following year averaged 5 miles (ranged from 0.75 to 19 miles (G. Proudfoot unpubl. data). Telemetry studies in Arizona during 1999 resulted in generally greater dispersal distances, ranging from 1.4 to 12.9 miles (straight line distance) (n=6, mean 6.2 miles) (S. Richardson, AGFD unpubl. data). On-going studies in the fall of 2000 indicate that juvenile dispersal distances may be even greater than previously documented (S. Richardson, AGFD pers. comm.). Juveniles typically dispersed from natal areas in July did not appear to defend a territory until September. They may move up to one mile in a night; however, they typically fly from tree to tree instead of long single flights (S. Richardson,

AGFD unpubl. data). Subsequent surveys during the spring have found that locations of male CFPOs are in the same general location as last observed the preceding fall.

In Texas, Proudfoot (1996) noted that, while CFPOs used between three and 57 acres during the incubation period, and they defend areas up to 279 acres in the winter; therefore, a 280 acre home range is considered necessary for CFPOs. Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 to 2,000 feet. Initial results from ongoing studies in Texas indicate that the home range of CFPOs may also expand substantially during dry years (G. Proudfoot unpubl. data).

### **Species status and distribution range wide**

The CFPO is one of four subspecies of ferruginous pygmy-owl. CFPOs are known to occur from lowland central Arizona south through western Mexico to the States of Colima and Michoacan, and from southern Texas south through the Mexican States of Tamaulipas and Nuevo Leon. It is unclear at this time if the ranges of the eastern and western populations of the ferruginous pygmy-owl merge in southern Mexico. However, genetic information indicates that eastern and western populations of the CFPO may be genetically dissimilar (G. Proudfoot, R. Zink, R. Blackwell, A. Fry, C. Tchida, P. Heidrich, and M. Wink unpubl. data). Genetic research is currently being funded by Pima County to determine whether there is any genetic variation within tissue samples collected in Arizona compared to samples from Mexico and Texas. Preliminary results remain consistent with earlier studies (about 1 percent difference between Arizona and Texas samples [G. Proudfoot unpubl. data]).

The Service is currently funding habitat studies and surveys in Sonora, Mexico to determine the distribution and relative abundance of the CFPO there. Based on the lack of sightings, they may be absent, rare, or uncommon in northern Sonora, Mexico (Hunter 1988, USFWS 1997). Preliminary results indicate that CFPOs are present in northern and central Sonora (USFWS unpubl. data). Further studies are needed to determine their distribution in Mexico.

The range of the Arizona Distinct Population Segment (DPS) of the CFPO extends from the International Border with Mexico north to central Arizona. The northernmost historic record for the CFPO is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the CFPO to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, the CFPO, 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, CFPOs were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (AGFD unpubl. data, Hunter 1988).

Records from the eastern portion of the CFPO's range include a 1876 record from Camp Goodwin (nearby current day Geronimo) on the Gila River, and a 1978 record from Gillard Hot Springs, also on the Gila River. CFPOs have been found as far west as the Cabeza Prieta Tanks in 1955 (Monson 1998).

Hunter (1988) found fewer than 20 verified records of CFPOs in Arizona for the period of 1971 to 1988. Formal surveys for the CFPO on OPCNM began in 1990, with one located that year. Beginning in 1992, survey efforts conducted in cooperation with the AGFD, located three single CFPOs on OPCNM [USFWS and Organ Pipe Cactus National Monument (OPCNM) unpubl. data]. In 1993, surveys were conducted at locations where CFPOs had been sighted since 1970. Only one CFPO was detected during these survey periods, and it was located in northwest Tucson (Felley and Corman 1993). In 1994, two CFPOs were located in northwest Tucson during informal survey work by AGFD (Abbate et al. 1996). In 1996, AGFD focused their survey efforts in northwest Tucson and Marana. A total of 16 CFPOs were detected, two of which were a pair, and two were fledglings. Three additional CFPOs were detected at OPCNM in 1996. There were also three additional, but unconfirmed, reports of CFPOs from OPCNM.

While the majority of Arizona CFPO detections in the last six years have been from the northwest Tucson area, CFPOs have also been detected in southern Pinal County, at OPCNM, on the Buenos Aires National Wildlife Refuge (BANWR), and on the Coronado National Forest.

In 1997, survey efforts of AGFD located a total of ten CFPOs in the Tucson Basin study area (the area bounded to the north by the Picacho Mountains, the east by the Santa Catalina and Rincon Mountains, the south by the Santa Rita and Sierrita Mountains, and the Tucson Mountains to the west). Of the eight CFPOs documented from this area, one pair successfully fledged four young. Two adult males were also located at OPCNM, with one reported from a previously unoccupied area (T. Tibbitts, OPCNM pers. comm. 1997).

In 1998, survey efforts in Arizona increased substantially, resulting in a greater number of documented CFPOs, which may, in part, account for a larger number of known owls. In 1998, a total of 35 CFPOs were confirmed (S. Richardson, AGFD unpubl. data, USFWS unpubl. data, T. Tibbitts, OPCNM unpubl. data, D. Bieber, Coronado National Forest (CNF) unpubl. data).

In 1999, a total of 41 adult CFPOs were found in Arizona at 28 sites. Of these sites, 10 had nesting confirmed by AGFD and the Service. CFPOs were found in three distinct regions of the state: Tucson Basin, Altar Valley, and OPCNM. Overall, mortality was documented for a number of fledglings due to natural (e.g., predation) or unknown causes. Of the 33 young found, only 16 were documented as surviving until dispersal (juveniles known to have successfully dispersed from their natal area). It is unclear what the survival rate for CFPOs is; however, as with other owls and raptors, a high mortality (50 percent or more) of young is typical during the first year of life.

Surveys conducted in 2000 resulted in 24 confirmed CFPO sites (i.e., nests and resident CFPO sites) and several other unconfirmed sites (S. Richardson, AGFD unpubl. data, T. Tibbitts, OPCNM unpubl. data, USFWS unpubl. data). A total of 34 adult CFPOs were confirmed. Nesting was documented at 7 sites and 23 fledglings were confirmed; however, as in 1999, greater than 50 percent fledgling mortality was documented (S. Richardson, AGFD unpubl. data). A total of 9 juveniles were known to have successfully dispersed from their natal areas in 2000. Successful dispersal was not confirmed at two nests with four fledglings. The status of the remaining fledglings is unknown; however, they are presumed dead.

- **Tucson Basin** - A total of 14 adults were confirmed at 10 sites (11 adults at seven sites in northwest Tucson and three adults at two sites in southern Pinal County). Three nests in northwest Tucson produced 10 fledglings, of which five juveniles successfully dispersed. One nest in southern Pinal County produced five fledglings, of which two juveniles successfully dispersed. There were several unconfirmed CFPO sites.
- **Altar Valley** - A total of seven adult CFPOs were documented at six sites. One nest was confirmed, producing four fledglings, of which four juveniles successfully dispersed from their natal area.
- **OPCNM** - Six sites were confirmed as active, although nesting was not confirmed at any of these sites.
- **Other** - There were two confirmed CFPO nest sites reported elsewhere in southern Arizona, producing four fledglings. It is unknown how many of these young successfully dispersed. There were several other reported, but unconfirmed CFPO sightings elsewhere in the state.

One factor affecting the known distribution of CFPOs in Arizona is where early naturalists spent most of their time and where recent surveys have taken place. For example, a majority of surveys in the recent past (since 1993) have taken place in OPCNM and in the Tucson Basin, and these areas are where most owl locations have been recorded. However, during the last three years (1998, 1999, and 2000), large, previously unsurveyed areas have been inventoried for owls, resulting in a much wider distribution than previously thought.

For example, before 1998, very few surveys had been completed in the Altar Valley in southern Pima County. Prior to 1999, the highest known concentration of CFPOs in the state was in northwest Tucson. However, in 1999, after extensive surveys in Altar Valley, more owls were found there (18 adults) than in northwest Tucson (11 adults), although there are still fewer nest sites in Altar Valley than in the Tucson Basin (S. Richardson, AGFD unpubl. data). As a result, knowledge is changing as to CFPO distribution and habitat needs as new information is collected.

### **Rangewide trend**

One of most urgent threats to CFPOs in Arizona is 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 directly and indirectly impacts CFPO survival and recovery (Abbate et al. 1999).

Habitat loss, degradation, and fragmentation are widely accepted causes contributing to raptor population declines worldwide (Snyder and Snyder 1975, Newton 1979, LeFranc and Millsap 1984). Habitat fragmentation is the process by which a large and continuous block of natural habitat is transformed into much smaller and isolated patches by human activity (Noss and Csuti 1994). Fragmentation has two components (1) reduction of the total amount of habitat type and (2) apportionment of remaining habitat into smaller, more isolated patches (Harris 1984, Wilcove et al. 1986, Saunders et al. 1991).

Nesting in small natural patches may have additional risks. For example, Haug (1985) found burrowing owl home range size increases with the percentage of vegetation disturbance. In fragmented landscapes, burrowing owls may forage greater distances and spend more time away from the nest, making them more vulnerable to predators, and therefore, less efficient at reproduction (Warnock and James 1997). As fragmentation increases, competition for fewer productive CFPO territories may occur (Abbate et al. 1999). Unlike other larger birds that can fly long distances over unsuitable or dangerous areas to establish new territories, CFPOs, because of their small size, and their short style of flight are exposed to greater risks from predation and other threats (Abbate et al. 1999).

Site tenacity in birds is one of many factors that may create time lags in response to fragmentation and other disturbances. Individuals may remain in sites where they bred successfully in the past, long after the habitat has been altered (Wiens 1985). Because of lack of data, it is unclear whether site tenacity for CFPOs, in increasingly fragmented landscapes, such as exists in the action area is a factor. For example, researchers have been closely monitoring an established CFPO site (documented each year since 1996) in which the male died in 1999, apparently from a collision with a fence (S. Richardson, Arizona Game and Fish Department unpubl. data.). This site was not known to be occupied in 2000. This site has the highest amount of development (33%) within its estimated home range of any other known nest site (S. Richardson, AGFD unpubl. data.). The site will continued to be monitored to determine if new owls reestablish a nest site.

In northwest Tucson, all currently known CFPO locations, particularly nest sites, are in low-density housing areas where abundant native vegetation separates structures. Additionally, they are adjacent to or near large tracts of undeveloped land. CFPOs appear to use non-native vegetation to a certain extent, and have been observed perching in non-native trees in close proximity to individual residences. However, the persistence of CFPOs in areas with an abundance of native vegetation indicates that a complete modification of natural conditions likely

results in unsuitable habitat conditions for CFPOs. While development activities are occurring in close proximity to owl sites, particularly nest sites, overall noise levels are low. Housing density is low, and as a result, human presence is also generally low. Roads in the areas are typically dirt or two-lane paved roads with low speed limits which minimizes traffic noise. Low density housing areas generally have lower levels of traffic noise because of the limited number of vehicles traveling through the area.

Other factors contributing to the decline of CFPO habitat include the destruction of riparian bottomland forests and bosques. It is estimated that 85 to 90 percent of low-elevation riparian habitats in the southwestern United States have been modified or lost; these alterations and losses are attributed to woodcutting, urban and agricultural encroachment, water diversion and impoundment, channelization, groundwater pumping, livestock overgrazing, and hydrologic changes resulting from various land-use practices (e.g., Phillips et al. 1964, Carothers 1977, Kusler 1985, Jahrsdoerfer and Leslie 1988, USFWS 1988, U.S. General Accounting Office 1988, Szaro 1989, Dahl 1990, State of Arizona 1990, Bahre 1991). Cutting of trees for domestic and industrial fuel wood was so extensive throughout southern Arizona that, by the late 19th century, riparian forests within tens of miles of towns and mines had been decimated (Bahre 1991). Mesquite was a favored species because of its excellent fuel qualities. In the project area, the famous vast forests of "giant mesquites" along the Santa Cruz River in the Tucson area described by Swarth (1905) and Willard (1912) fell to this threat, as did the "heavy mesquite thickets" where Bendire (1888) collected CFPO specimens along Rillito Creek, a Santa Cruz River tributary, in present-day Tucson. Only remnant fragments of these bosques remain.

Regardless of past distribution in riparian areas, it is clear that the CFPO has declined throughout Arizona to the degree that it is now extremely limited in distribution in the state (Johnson et al. 1979, Monson and Phillips 1981, Davis and Russell 1984, Johnson-Duncan et al. 1988, Millsap and Johnson 1988, Monson 1998). A very low number of CFPOs in riparian areas in recent years may reflect the loss of habitat connectivity rather than the lack of suitability (Cartron et al. 2000b).

In recent decades, the CFPO's riparian habitat has continued to be modified and destroyed by agricultural development, woodcutting, urban expansion, and general watershed degradation (Phillips et al. 1964, Brown et al. 1977, State of Arizona 1990, Bahre 1991, Stromberg et al. 1992, Stromberg 1993a and 1993b). Sonoran desert scrub has been affected to varying degrees by urban and agricultural development, woodcutting, and livestock grazing (Bahre 1991). Pumping of groundwater and the diversion and channelization of natural watercourses are also likely to have reduced CFPO habitat. Diversion and pumping result in diminished surface flows, and consequent reductions in riparian vegetation are likely (Brown et al. 1977, Stromberg et al. 1992, Stromberg 1993a and 1993b). Channelization often alters stream banks and fluvial dynamics necessary to maintain native riparian vegetation. The series of dams along most major southwestern rivers (e.g., Colorado, Gila, Salt, and Verde Rivers) have altered riparian habitat downstream of dams through hydrological and vegetational changes, and have inundated former habitat upstream.

In the United States, CFPOs are rare and highly sought by bird watchers, who concentrate at a few of the remaining known locations. Limited, conservative bird watching is probably not harmful; however, excessive attention and playing of tape-recorded calls may at times constitute harassment and affect the occurrence and behavior of the CFPO (Oberholser 1974, Tewes 1993). For example, in 1996, a resident in Tucson reported a CFPO sighting which subsequently was added to a local birding hotline and the location was added to their website on the internet. Several car loads of birders were later observed in the area of the reported location (S. Richardson, AGFD pers. comm. 1999).

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

Human activities near nests at critical periods of the nesting cycle may cause CFPOs to abandon their nest sites. In Texas, three of 102 CFPO nests monitored from 1994 through 1999 were abandoned during the early stage of egg laying. Although unknown factors may have contributed to this abandonment, researchers in Texas associated nest abandonment with nest monitoring (G. Proudfoot pers. comm.). Some outdoor recreational activities (e.g., off road vehicle [ORV] and motor bike use/racing, firearm target practicing, jeep tours, etc.) may disturb CFPOs during their breeding season (particularly from February through July (G. Proudfoot pers. comm. 1999 and S. Richardson, AGFD pers. comm. 1999). Noise disturbance during the breeding season may affect productivity; disturbance outside of this period may affect the energy balance and, therefore survival. Wildlife may respond to noise disturbances during the breeding season by abandoning their nests or young (Knight and Cole 1995). It has also become apparent that disturbance outside of a species' breeding season may have equally severe effects (Skagen et al. 1991).

Currently, all known nesting CFPOs within northwest Tucson are located in areas containing no development or low-density housing developments that are adjacent to undeveloped tracts of land with varying amounts of noise disturbance. Individual CFPOs may react differently to noise disturbances; some individuals exhibit less tolerance than others. Noise can affect animals by disturbing them to the point that detectable change in behavior may occur. Such behavioral changes can affect their activity and energy consumption (Bowles 1995). Dangerous or unfamiliar noises are more likely to arouse wildlife than harmless and familiar noises. Habituation is the crucial determinant of success in the presence of noisy disturbances. Exposure to noise for some experienced birds may produce no or minimal losses (Black et al. 1984). The habituation process can occur slowly, so it may not be detectable in the short-term. In the long-term, some nesting birds become more tenacious and less responsive in the presence of human

disturbance if they are not deliberately harassed (Burger and Gochfeld 1981). It is unknown if noise habituation occurs in some CFPOs as it does with other bird species. Robert and Ralph (1975), Schreiber (1979), Cooke (1980), Parsons and Burger (1982), Ainley et al. (1983), and McNicholl (1983) found that adult birds, and chicks to some extent, habituated to the presence of humans, and their responses to people seemed to be less than those of undisturbed birds. Burger and Gochfeld (1981) and Knight et al. (1987) found responses to noise disturbances and habituation in nesting birds become more tenacious and less responsive in the presence of human disturbance if they were not deliberately harassed.

Raptors in frequent contact with human activities tend to be less sensitive to additional noise disturbances than raptors nesting in remote areas. However, exposure to direct human harassment may make raptors more sensitive to noise disturbances (Newton 1979). Where prey is abundant, raptors may even occupy areas of high human activity, such as cities and airports (Newton 1979, Ratcliffe 1980, White et al. 1988). The timing, frequency, and predictability of the noise disturbance may also be factors. Raptors become less sensitive to human disturbance as their nesting cycle progresses (Newton 1979). Studies have suggested that human activities within breeding and nesting territories could affect raptors by changing home range movements (Anderson et al. 1990) and causing nest abandonment (Postovit and Postovit 1987, Porter et al. 1973).

During the first week of March 2000, an unpaired male CFPO was monitored two to three times a week, in the action area (S. Richardson, AGFD unpubl. data). This same male has been holding this territory since the fall of 1998. This owl was unpaired last year (1999), and the duration of its vocalizations this year (2000) indicate that it may still be unpaired and trying to attract a mate. Vegetation was cleared in early 2000 on a 10-acre parcel which was within 130 feet of where this male had been repeatedly observed prior to grading. Subsequent to grading of this parcel, this male moved approximately 0.25 mile away from its previous location. It is unknown whether this activity, the removal of vegetation on the 10-acre site, the associated noise of large equipment grading the site, or both, affected this owl, causing it to move out of the area. However, it is unusual for adult males to move such a long distance in the spring, and such movement has not been observed in Arizona prior to this incident (S. Richardson, AGFD pers. comm.). Movement of a such a considerable distance, during this time of year, may indicate that such activities may have adverse impacts on owls and could force them out of an area, or cause them to move from areas where such activity takes place.

Application of pesticides and herbicides in Arizona occurs year-round, and these chemicals pose a potential threat to the CFPO. The presence of CFPOs 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 CFPOs and may be a threat to CFPOs and their prey; in one case, drums of toxic solvents were found within one mile of a CFPO detection (Abbate et al. 1999).

Little is known about the rate or causes of mortality in CFPOs; however, they are susceptible to predation from a wide variety of species. In Texas, eggs and nestlings were predated upon by raccoons (*Procyon lotor*) and bullsnakes (*Pituophis melanoleucus*). Both adult and juvenile CFPO are likely killed by great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks, and eastern screech-owls (*Otus asio*) (Proudfoot and Johnson 2000, G. Proudfoot unpubl. data). CFPOs are particularly vulnerable to predation and other threats during and shortly after fledging (Abbate et al. 1999). Therefore, cover near nest sites may be important for young to fledge successfully (Wilcox et al. 1999, Wilcox et al. 2000). Although nest depredation has not been recorded in Arizona, only a few nests have been monitored (n = 21 from 1996 through 1999). Additional research is needed to determine the effects of predation, including nest predation, on CFPOs in Arizona and elsewhere.

Another factor that may affect CFPOs is interspecific competition/predation. In Texas, predation of two adult female CFPOs nesting close to screech-owls was recorded. These incidences were recorded as "depredation by screech-owl" after examination of the CFPO carcasses and assessment of circumstances (i.e., one CFPO attempted to nest in a box that was previously used as screech-owl roost site and the other CFPO established a nest in a box within five meters (16 feet) of screech-owl nest site). Conversely, CFPOs and screech-owls were also recorded successfully nesting within 2 meters (seven feet) of each other in the same tree without interspecific conflict. The relationship between CFPO and other similar small owl species needs further study.

Direct and indirect human-caused mortalities (e.g., collisions with cars, glass windows, fences, power lines, domestic cats [*Felis domesticus*], etc.), while likely uncommon, are often underestimated, and probably increase as human interactions with owls increase (Banks 1979, Klem 1979, Churcher and Lawton 1987). This may be particularly important in the Tucson area where many CFPOs are located. CFPOs flying into windows and fences, resulting in serious injuries or death to the birds, have been documented twice. A CFPO collided into a closed window of a parked vehicle; it eventually flew off, but had a dilated pupil in one eye indicating serious neurological injury as the result of this encounter (Abbate et al. 1999). In another incident, an adult owl was found dead on a fence wire; apparently it flew into a fence and died (S. Richardson, AGFD, unpubl. data). AGFD also has documented an incident of individuals shooting BB guns at birds perched on a saguaro which contained an active CFPO nest. In Texas, two adult CFPOs and one fledging were killed by a domestic cat. These owls used a nest box about 75 meters (246 feet) from a human residence. Free roaming cats can also affect the number of lizards, birds, and other prey species available to CFPOs; however, very little research has been done in the Southwest on this potential problem.

Because CFPOs have been observed moving around the perimeter of golf courses, avoiding non-vegetated areas, roads and other openings, these areas may act as barriers to their movements (Abbate et al. 1999, S. Richardson, AGFD unpubl. data). On one occasion, a radio-tagged dispersing juvenile stopped within 0.7 mile of Interstate 10 where there were large openings and few trees or shrubs, and reversed its direction (Abbate et al. 1999). However, radio-tagged

juvenile CFPOs have been observed on several occasions crossing two-lane roads with light to moderately heavy vehicular traffic, where trees and large shrubs were present on either side (Abbate et al. 1999).

Fires can affect CFPOs by altering their habitat (Abbate et al. 1999). A recent fire altered habitat near an active CFPO nest site (Flesch 1999) and although four mature saguaros in the area survived (at least in the short-term), post-fire mortality of saguaros has been recorded (Steenbergh and Lowe 1977 and 1983, McLaughlin and Bowers 1982). Flesch (1999) also noted that approximately 20 to 30 percent of the mesquite woodland within 50 meters (164 feet) of the nest was fire- or top-killed, and ground cover was also eliminated until after the summer monsoons. Careful use of prescribed fires in areas potentially suitable for CFPOs is necessary so that habitat is not lost or degraded (Flesch 1999).

Low genetic variability can lead to a reduction in reproductive success and environmental adaptability. Caughley and Gunn (1996) note that small populations can become extinct entirely by chance even when their members are healthy and the environment favorable. The pairing of siblings or parents with their offspring, particularly in raptors, is rare, and has been documented in only 18 cases, representing seven species (Carlson et al. 1998). Four of these species were owls: barn owls, burrowing owls (*Athene cunicularia*), screech-owls, and spotted owls (*Strix occidentalis*). In 1998 and 1999, two cases of sibling CFPOs pairing and breeding were documented (Abbate et al. 1999). In both cases, young were fledged from the nesting attempts. These unusual pairings may have resulted from extremely low numbers of available mates within their dispersal range, and/or from barriers (including fragmentation of habitat) that has influenced dispersal and limited the movement of young owls (Abbate et al. 1999). Further, because the CFPO is nonmigratory, there may be an additional limitation on the flow of genetic material between populations which may reduce the chance of demographic and genetic rescue from immigration from adjacent populations.

Environmental, demographic, and genetic stochasticity, and catastrophes have been identified as interacting factors that may contribute to a population's extinction (Hunter 1996). Environmental stochasticity refers to random variation in habitat quality parameters such as climate, nutrients, water, cover, pollutants, and relationships with other species such as prey, predators, competitors, or pathogens. Demographic stochasticity is uncertainty due to random variation in reproductive success and survivorship of individuals. Genetic stochasticity is the random variation in gene frequencies of a population due to genetic drift, bottlenecks, inbreeding, and similar factors. Catastrophes are events such as droughts or hurricanes that occur randomly. When these factors interact with one another, there are likely to be a combination of effects, such that a random environmental change like habitat fragmentation can result in population and genetic changes by preventing dispersal. These factors are much more likely to cause extinction when a species' numbers are already extremely low. The small, fragmented population of CFPOs in Arizona may not have the ability to resist change or dramatic fluctuations over time caused by one or more of the factors mentioned above.

Soule (1986) notes that very small populations are in extreme jeopardy due to their susceptibility to a variety of factors, including demographic stochasticity, where chance variations in birth and death rates can result in extinction. A series of environmental changes such as habitat reduction reduce populations to a state in which demographic stochasticity takes hold. In small populations such as with the CFPO, each individual is important for its contributions to genetic variability of that population. As discussed above, low genetic variability can lead to a lowering in reproductive success and environmental adaptability, affecting recovery of this species.

### **Environmental baseline**

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

### **Action area**

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR §402.02). In the BA, the applicant did not define the action area. The Service has determined the action area to include the project site and areas within 19 miles of the project site. We based this determination on the dispersal distance of juvenile CFPOs in Texas and Arizona (Proudfoot unpubl. data, S. Richardson, AGFD unpubl. data). With so few individual CFPOs in Arizona, the maximum dispersal distance may be periodically needed to maintain genetic interchange between groups of owls. On two separate occasions in another area of northwest Tucson, siblings of the same nest were documented breeding with each other the following year (Abbate et al. 1999) (see Range wide Trend section below). Instances of sibling breeding may be a reflection of small, isolated populations of owls, and maintaining genetic diversity within depressed populations is important to maintain genetic stochasticity and fitness. AGFD (unpubl. data) has documented movement between CFPOs in southern Pinal County and northwest Tucson and the Service maintains this genetic interchange is important. Therefore, the action area includes known owls within northwest Tucson and southern Pinal County. The action area supports one of the highest known concentrations of breeding CFPOs in the state (four out of the seven confirmed nest sites for the entire listed population in 2000) (S. Richardson, AGFD unpubl. data, USFWS unpubl. data).

CFPOs were first documented in the action area around 1872 (see Status and Distribution section above) and historically were widespread in the action area. Collections of CFPOs were fairly regular in this region compared to elsewhere in the state until 1918 (Johnson et al. in prep.). Only one CFPO observation was recorded between 1918 and the 1970's (Hunter 1988, Johnson et al. in prep.). Several sightings of CFPOs were documented during the 1970's in the Tucson Basin; however, systematic surveys did not take place until 1993 by AGFD. Survey efforts in

this area have dramatically increased since listing, particularly in the last three years (USFWS unpubl. data). In addition, AGFD initiated radio telemetry research in the action area in 1998, which has provided valuable information on habitat use and movement patterns of adult and juvenile CFPOs.

We currently know of only a small population (14 adults in the year 2000) of CFPOs in the action area. However, the information regarding owl use of this area over time has been limited. Information collected in the action area, and particularly the vicinity of the project site, represents only limited data, collected primarily over the past few years. For example, use of radio telemetry equipment, which provides detailed information on use patterns and areas was not utilized until 1998, and its use has been limited by the small number of birds equipped with transmitters and the project having available resources (i.e., limited personnel for intensive monitoring and equipment). In addition, battery life on radio transmitters is limited to only 90 days because of the small size that must be used on these small owls, which further limits the amount of telemetry data that can be collected.

Current information suggests that CFPOs can live and breed successfully in areas which have undergone at least some degree of low density human development; however, they do not appear to be able to tolerate all types of development. As of 1999, more owl sites in Arizona have been documented with little or no human activity and development [14 sites (20 adult owls)], compared to developed areas [10 sites (14 adult owls)] (S. Richardson, AGFD unpubl. data, USFWS unpubl. data). To determine the level of vegetation disturbance nesting CFPOs may be able to tolerate, a group of CFPO experts completed an analysis of all nest site home ranges (n=6) occurring in developed areas that successfully produced offspring. They calculated the amount of vegetation disturbance (e.g., roads, buildings, horse corals, pastures, parking lots, golf courses, etc.) within the estimated home range (280 acres) at each nest site. They calculated their average percent disturbance to be 21 percent (median 21 percent). However, four of the six home ranges had levels below that average. Three of the six sites were within the 20 to 25 percent disturbance range.

There also appears to be a difference in the tolerance to the amount of vegetation disturbance (i.e., development) between nesting and non-breeding CFPOs. Single owls may be able to tolerate higher levels of development and more marginal habitats, while breeding owls may need less disturbed vegetation within their home ranges. An analysis of all known CFPO sites in northwest Tucson resulted in a considerably lower amount of vegetation disturbance at nest sites compared to non-breeding sites (e.g., unpaired males) (S. Richardson, AGFD unpubl. data). As stated above, the average amount of vegetation disturbance within the home range of 1998-2000 nesting sites was 21 percent (also the median). The amount of vegetation disturbance within the home range of non-breeding sites was considerably higher, averaging 39 percent (median 31 percent). Although these overall results are based on a small sample size (n=10), they represent the best available information and indicate that nesting CFPOs may require less disturbed areas than unpaired owls.

For example, a juvenile male CFPO established a new territory in the fall of 1999 in a highly developed residential area in northwest Tucson and remained there throughout the 2000 breeding season. This male failed to pair with a female owl, even after vigorous calling throughout the spring and summer months. Within its estimated home range, habitat is highly fragmented, containing the highest degree of development (50 percent ) of any other known CFPO territory (S. Richardson, AGFD unpubl. data.). Differences in the tolerance of vegetation disturbance between breeding and non-breeding owls are important because nesting owls are necessary for recruitment of young owls and demographic support to achieve recovery of the CFPO in Arizona. Although also important to the population from a demographic standpoint, non-breeding males do not directly contribute to the increase of the population by producing young.

The Service and the CFPO Recovery Team believe that because successful breeding sites are necessary to produce offspring for the survival and eventual recovery of the CFPO Arizona population, vegetation disturbance levels found at breeding sites should be used as guidelines rather than those in non-breeding territories. These guidelines are particularly important within specific areas of the state [i.e., Special Management Areas (SMAs)] as identified by the Recovery Team (USFWS 2000). More research and monitoring is needed to better understand habitat needs and the relationship between development and CFPO requirements.

It should be noted that the nest site with the highest amount of vegetation disturbance (33 percent) is that of a long established pair that was documented from 1997 through 1999. Development in the general vicinity of this site continued during this time. The male of this pair was found dead late last summer (1999). Surveys in 2000 did not locate any CFPOs at this site. Site tenacity in the short-term may have been a factor in this pair's ability to withstand this higher level of vegetation disturbance compared to other sites in Arizona; however, the long-term effect of this amount of disturbance is unknown. Other than at this site, nesting owls have not been documented in areas with more than 25 percent . As stated above, 14 of the 24 known owl sites in 2000 were located in undeveloped areas, which places the level of vegetation disturbance at this nest site even further as an extreme, compared to all the other sites in the state. The amount of development at this site is considered an exception rather than the norm; therefore, a maximum of 20 percent vegetation disturbance guideline is used for this SMA, particularly for large projects, to provide for the survival and recovery of the CFPO (USFWS 2000).

Over the past 12-month period, the Service has conducted more than 75 informal section 7 consultations within the action area (e.g., planned residential, commercial, and other developments) and have provided technical assistance to hundreds of individuals seeking to develop single family residences on individual lots. In addition, in December 1999, approximately 40 acres were graded for the Amphitheater High School site in northwest Tucson. We did not receive a request for consultation on this activity prior to grading.

We have completed several livestock grazing consultations with the USDA Forest Service and Bureau of Land Management (BLM) in southern and central Arizona that addressed adverse impacts to CFPOs. These consultations resulted in non-jeopardy and no adverse modification

determinations by the Service. In July 2000, we completed a consultation with the Environmental Protection Agency (EPA) for a 20-acre residential development (Countryside Vistas Blocks V and VI), approximately 3.5 miles to the south of the project site. This consultation resulted in the conservation of 60 acres of off-site lands in the Tucson Basin that will be managed for the CFPO.

In December 1998, an ESA section 10(a)(1)(B) permit for the CFPO was issued by the Service for a guest ranch (Lazy K Bar) which may eventually be converted to low density residential housing in northwest Tucson. Pima County is currently working with the Service on developing a county-wide Sonoran Desert Conservation Plan (SDCP). If approved, this plan will result in the issuance of a section 10 permit to Pima County and other participating jurisdictions. It will not only cover CFPOs but has the potential to address several other listed and sensitive species.

### **Project site**

The proposed project site is located on the alluvial fan of the Tortolita Mountains at about the 2,200-foot elevation. Slopes are generally less than three percent and descend southwesterly to the Santa Cruz River, located about 2.5 miles southwest of the site. The east side of the property is bordered by an existing Tucson Electric Power (TEP) transmission line right-of-way that is unvegetated.

The project site contains suitable CFPO habitat, is near existing urban development, and near undeveloped State Trust lands that support suitable CFPO habitat. Surveys in this area have not been comprehensive, but there is documentation of dispersing juveniles moving through the action area. At present, this land is not developed; however, State Trust lands may be sold or exchanged and could be used by future owners for development. Presently, State Trust lands are being leased for grazing. Other activities (e.g., recreational off-road vehicle [ORV] use, shooting/target practice, hunting, etc.) also occur on these lands.

The project site is within the Arizona Upland Subdivision of the Sonoran Desertscrub vegetation community (Brown 1994). This subdivision is limited in its distribution, forming a narrow, curved band along the northeast edge of the Sonoran Desert from the Buckskin Mountains, southeast to Phoenix, Arizona, and south to Altar, Sonora, Mexico. It is described as a low woodland of leguminous trees with an overstory of columnar cacti and with one or more layers of shrubs and perennial succulents. Within the United States, columnar cacti include either saguaros (*Carnegiea gigantea*), or organ pipe cactus (*Stenocereus thurberi*). Trees within this subdivision include blue paloverde (*Cercidium floridum*), foothills paloverde (*C. microphyllum*), ironwood (*Olneya tesota*), mesquites (*Prosopis* spp.), and cat-claw acacia (*Acacia* spp.). Cacti of many species are found within this subdivision, and include many varieties of cholla and prickly pear (*Opuntia* spp.), fish-hook barrel cactus (*Ferocactus wislizenii*), and compass barrel cactus (*F. acanthodes*) (Brown 1994).

Dominant overstory vegetation includes ironwood (*Olneya tesota*) and foothill paloverde (*Cercidium microphyllum*), many of which are six inches or greater in diameter at breast height (dbh). Mesquites (*Prosopis* spp.) occur at a low level. The understory is dominated by triangle-leaf bursage (*Ambrosia deltoidea*) and creosote bush (*Larrea tridentata*). Less abundant understory species include burrobush (*Hymenoclea salsola*), desert hackberry (*Celtis spinosa*), fluffgrass (*Tridens pulchellus*), and scattered cholla (*Opuntia* spp.) and barrel cactus (*Ferocactus wislizenii*). Ten to 12 saguaros (*Carnegiea gigantea*), many with potential nest cavities, are present and scattered on the 10-acre project area. Four or five small ephemeral washes run from northeast to southwest across the property. Vegetation in these washes is xeroriparian.

During surveys in 1999 (SWCA 1999) and 2000 (Westland Resources, Inc. 2000), CFPO were not detected within the project area. The 1999 survey area was approximately 230 acres and included the 10-acre project site and nearby vegetation communities and areas (Figure 4, BA). In 1999, surveys were conducted according to a proposed new protocol written jointly by AGFD and USFWS, which was finalized in January 2000 (AGFD and USFWS 2000).

Surveys for the year 2000 were conducted within the 10-acre project area. With the exception of the first visit, surveys were conducted according to the finalized in January 2000 protocol (AGFD and USFWS 2000). Notice for this protocol was published in the March 20, 2000, Federal Register (USFWS 2000a).

AGFD has documented CFPO moving through existing wash corridors between high density developments in the action area and scattered throughout the northwest Tucson area. AGFD conducted a single survey (Spring 1999) along that portion of the high tension powerline located immediately east and north of the project site. CFPO was not detected during this survey. The closest known CFPO records to the project site are two nesting pairs of CFPO located about two miles from the project area (S. Richardson pers. comm. 1999). A summary of CFPO survey effort is provided in Table 2.

Table 2. CFPO Survey Summary

Survey Location	Year of Survey	Survey Area (Acres)	Number of Surveys	Survey Dates
Portions of Section 33, T11S, R12E and Portions of Section 4, T12S, R12E	1999	230 (including 10-acre project area)	3	(1) 25 and 28 March, (2) 15 April (3) 5 May
Portions of Sections 32 and 33, T11S, R12E	2000	90 (including 10-acre project area)	3	(1) 4 January (2) 4 and 8 February (3) 28 and 29 February

## **EFFECTS OF THE ACTION**

### **Direct and Indirect Effects**

The proposed action will result in the permanent loss of 3.1 acres of CFPO critical habitat (containing constituent elements) that provides foraging, sheltering, and movement and dispersal habitat, and shows the potential to support nesting pairs as owls disperse from nearby nests.

Researchers in Arizona have determined that CFPOs require habitat linkages within and between territories for movement and dispersal. These linkages consist 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 (S. Richardson, AGFD unpubl data, Abbate et al. 1999). CFPOs, particularly juveniles, are susceptible to predation, weather extremes, human-related injury/mortality factors (e.g., cars, buildings, fences, domestic cats, etc.) and other mortality factors (mortality of juveniles is typically 50 percent or greater for owls and other raptors). Therefore, it is essential to maintain habitat conditions that reduce their exposure to these threats and provide protection as they disperse from their natal areas. A high degree of cover throughout the landscape increases the likelihood of survivorship to the next breeding season. Limiting these mortality factors is critical, especially for small, depressed populations such as CFPOs in Arizona.

Because there are active nest sites within two miles of the project site, there is great potential that juvenile CFPOs will disperse onto and through the project site. Dispersing CFPOs typically move great distances during the dispersal period, ranging several miles and over wide areas before selecting a territory, where they will remain throughout the remainder of the fall and winter. The AEPCO transplanting, planting, and watering and survivability commitments will continue to allow CFPOs to move within and through the project site, at the same time, providing for enhanced nesting habitat for future territory establishment.

Minor loss of short, brushy grasses and vegetation may occur as a result of changing out utility poles associated with the four existing distribution lines along Tangerine Road. These impacts are expected to be minimal because the existing lines are located within the Tangerine Road right-of-way and the ground only supports grasses and low brush. As discussed above, two additional circuits are available for future line distribution from the proposed substation. If it is determined that these two lines could potentially adversely affect listed species, section 7 consultation would be required prior to construction or addition of these lines.

AEPCO has positioned the substation on the lowest-quality CFPO critical habitat available on the project site, out of any washes. This site was analyzed and determined to require the minimum removal and/or transplanting of constituent elements. AEPCO will maintain and significantly improve the remaining CFPO critical habitat with additional planted trees and cacti, with watering in place for at least two years, if not longer. AEPCO has committed to replacing any transplanted or planted trees or cacti that die, ensuring 100 percent survival. Trees will be

concentrated in the washes, where high quality CFPO habitat already exists. Long-term noise and human disturbance is minimal from this project, and due to these factors, this site could be expected to measurably enhance CFPO movement, foraging, roosting, and provide nesting habitat in the project area.

The Service does not anticipate any CFPO will be killed as a direct result of this project. The Service expects that CFPOs will avoid the developed 3.1 acres of the site and will concentrate activities in the vegetation maintained and enhanced on the remainder of the project site.

### **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.

Because of the high level of existing fragmentation and urban development in northwest Tucson, particularly between Cortaro Farms Road and Tangerine Road, east of Interstate 10, and west of La Cholla Boulevard, very few suitable areas not already occupied by nesting CFPO are available to fledgling owls upon leaving their natal area to establish a new territory. Reviewing dispersal data compiled by AGFD using radio telemetry over the past three breeding seasons, dispersing juveniles from sites in this area typically move several miles to the north, to areas with lower levels of development and less fragmentation, to establish their territory (S. Richardson, AGFD unpubl. data). This may indicate that suitable nesting habitat not currently being used for nesting (such as the project site) south of Tangerine Road is limited, and dispersing juveniles are forced to continue to move to less developed areas; therefore, these areas are extremely limited and of highest concern.

Because the construction work will occur outside the CFPO breeding season, this will alleviate much, if not all, noise disturbance to CFPO that may be in or adjacent to the project area during construction. After construction is completed, there may be long-term noise disturbance (low humming from the electrical lines) and a very slight increase in human presence at the site during maintenance and repair visits. It is anticipated these low levels of noise and activity will not have substantial adverse effects on owls in the area. Because of the lack of data specific to this subspecies in Arizona, we must also rely in part on our knowledge of effects this type of action may have on other species, particularly other raptors.

Currently, all known CFPOs within northwest Tucson are located in areas containing low-density housing developments that are adjacent to undeveloped tracts of land with varying amounts of noise disturbance. Individual CFPOs may react differently to noise disturbances, with some individuals exhibiting less tolerance than others. It is unknown if noise habituation occurs in some CFPOs as it does with other bird species (Black et al. 1984). Robert and Ralph (1975), Schreiber (1979), Cooke (1980), Burger and Gochfeld (1981), Parsons and Burger (1982), Ainley et al. (1983), and McNicholl (1983) found that adults, and chicks to some extent, habituated to the presence of humans, and the responses of disturbed birds to people seemed to be less than

those of undisturbed birds. Burger and Gochfeld (1981) and Knight et al. (1987) found responses to noise disturbances and habituation in nesting birds become more tenacious and less responsive in the presence of human disturbance if they were not deliberately harassed.

Raptors in frequent contact with human activities tend to be less sensitive to additional disturbances than raptors nesting in remote areas. However, exposure to direct human harassment may make raptors more sensitive to disturbances (Newton 1979). Where prey is abundant, raptors may even occupy areas of high human activity, such as cities and airports (Newton 1979, Ratcliffe 1980, White et al. 1988). The timing, frequency, and predictability of the disturbance may also be factors. Raptors become less sensitive to human disturbance as their nesting cycle progresses (Newton 1979). Studies have suggested that human activities within breeding and nesting territories could affect raptors by changing home range movements (Anderson et al. 1990) and causing nest abandonment (Postovit and Postovit 1987, Porter et al. 1973).

With respect to CFPOs and noise disturbance at the project site, human use in and around the site will be short-term and frequent during substation construction (several people and equipment, about one month) and infrequent over the long-term (one person, about once every three months, for one day). Construction will occur outside the CFPO breeding season. CFPO would be expected to avoid use of the 3.1 acre substation and continue to use the remainder of the project site (set-aside land, washes, and any other nearby undeveloped lands). Human access to the site will be restricted by a locked, gated, and fenced perimeter and only opened for appropriate personnel.

Movement corridors (streams or ephemeral washes containing high densities of ironwood, palo verde, or mesquite trees) on the remaining acres of the project site will be maintained and improved to a higher level of CFPO critical habitat and enhance CFPO constituent elements in the short- and long-term.

While there will be a permanent loss of 3.1 acres of CFPO critical habitat, the loss at this specific site is expected to be insignificant because of the anticipated retention and addition of constituent elements on the project site (transplants and significant plantings of trees and saguaro). AEPCO's commitment to plant survivability is anticipated to result in a significant improvement of constituent elements on the remaining acres of project site. An approximation of total critical habitat acres in the action area is about 10,800+/- acres, some of which do not contain or will not grow into constituent elements for the CFPO. The Service believes the retention and quality improvement of CFPO critical habitat constituent elements on the remaining acres of the project site offsets the loss of 3.1 acres at this specific site at this specific time.

The five acre set-aside area will not be developed. Any future plans for the 1.9 acres will undergo section 7 consultation. AEPCO will provide short- and long-term maintenance and ensure enhanced and improved CFPO critical habitat with their high planting ratios (and commitment to survivability) for ironwood, mesquite, and saguaro. AEPCO will plant additional

trees and cacti per the requirements and standards of the NPPO. Every third planted ironwood will be a 24-inch boxed tree. AEPCO will concentrate their tree planting along the natural washes on the site and will water all planted and transplanted trees and cacti until they become firmly established (two years minimum, longer if necessary, as determined by a qualified botanist). AEPCO will ensure 100 percent survival by replacing any transplanted or planted trees or cacti on the site that die. These project actions will measurably increase and improve canopy and nesting habitat for the CFPO on the project site, even though AEPCO will have removed 3.1 acres of original CFPO critical habitat.

### CUMULATIVE EFFECTS

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

Other actions reasonably certain to occur in the action area are completion of the (projected) 10-year build out and further development of infrastructure (electrical, water, communication, transportation) needs. Homes and other structures that are developed on less than five acres generally have no Federal connection (nexus) and continue throughout this area. Tucson is developing rapidly and Pima County has begun a county-wide planning and development process (Sonora Desert Conservation Plan) that is intended to minimize losses of intact desert ecosystems, while still providing for growth in other areas.

### CONCLUSION

After reviewing the current status of the CFPO, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the CFPO, and is likely to destroy or adversely modify designated critical habitat. We base this conclusion on:

1. The proposed project, while located in CFPO critical habitat, is **not** within an SMA,
2. The proposed project will result in the permanent loss of 3.1 acres of CFPO critical habitat,
3. AEPCO will deed-restrict five acres of CFPO critical habitat on the project site and undergo section 7 consultation on any future actions in the project area, and
4. CFPO movement, foraging, and roosting will be protected and measurably enhanced on the remainder of the project site (6.9 acres). Potential CFPO nesting habitat will be created through AEPCO transplanting trees and cacti (including saguaros); planting additional numbers and significant sizes of trees and saguaros, replacing any trees and saguaros that die, and watering all transplanted and planted trees and saguaro on the project site, ensuring 100 percent survivability.

### **INCIDENTAL TAKE**

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 further defined by FWS 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 by FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Direct or indirect impacts resulting in mortality of a CFPO caused by increased human activity is not anticipated to occur due to the relatively small scale of this action, the occasional and infrequent visit to the substation by maintenance personnel, (once every three months, for one day), and minimization measures (short-term construction outside CFPO breeding season, native plant species protection, transplanting, planting of additional trees and cacti, and watering to ensure survivability).

The Service does not anticipate that the proposed action will incidentally take any CFPO. However, if a CFPO is located on or nearby the project site, additional actions are warranted. If the Service, RUS, AGFD, or AEPCO become aware of a new CFPO nest or activity center of a CFPO on or within 0.4 mile (600 meters) of the subject property, they shall immediately notify each of the other agencies or parties and reinitiate consultation.

### **DISPOSITION OF DEAD OR INJURED LISTED SPECIES**

Upon locating a dead or injured threatened or endangered species, initial notification must be made to the Service's Division of Law Enforcement, 26 North McDonald, #105, Mesa, Arizona, 85201, at (602) 835-8289 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 species, 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 animals shall be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information above shall be obtained and the carcass left in place. Arrangements regarding proper disposition of potential museum specimens shall be made with the institution prior to implementation of the action. Injured animals should be transported to a qualified veterinarian by a qualified biologist. Should any

treated listed species survive, the Service should be contacted regarding the final disposition of the species.

### **CONSERVATION RECOMMENDATIONS**

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

The Service recommends that RUS actively assist and/or contribute funding for on-going CFPO research.

### **REINITIATION - CLOSING STATEMENT**

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

The Service appreciates your efforts on behalf of threatened and endangered species and the lands they inhabit. Please contact Thetis Gamberg at 520-670-4619 or Sherry Barrett at 520-670-4617 of my Tucson staff with any questions or concerns. Please refer to consultation number, 2-21-99-F-198, in future correspondence concerning this project.

Sincerely,

David L. Harlow  
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES:Steve Chambers)  
Teri McCaulou, AEPCO, Benson, AZ

Terry Johnson, Nongame Branch, Arizona Game and Fish Department, Phoenix, AZ

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## CONCURRENCE

### **Lesser long-nosed bat**

The endangered lesser long-nosed bat is a migratory species, feeding mainly on nectar and pollen from columnar cacti and agaves (USFWS 1998). Known roosts and maternity colonies are typically located in abandoned mine tunnels and caves. Lesser long-nosed bat are strong fliers; they have been documented to fly up to 40 miles from a roost site to forage on nectar and fruit. Critical habitat is not designated for this species.

Suitable or potential roost sites (mine tunnels or natural caves) are not known to exist in the project vicinity. The 10-acre project area is within the known range of the bat, but only five saguaros (three less than 30 inches tall, one about six feet tall, and one non-viable for transplant) are located within the 3.1-acre portion proposed for development; there are no agaves in the project area. Though it is possible that this species occasionally forages in the project area, the effects of vegetation disturbance are expected to be insignificant compared to the entire Tucson area available for bat foraging activities. Prior to construction, four of the saguaros will be transplanted within the 10-acre project area. Eight other saguaros (two feet tall) will be planted on the site. The fifth saguaro on the site will not survive transplantation because of previous damage by vandals.

The project site is within the known range of the lesser long-nosed bat. This small collection of plants is insignificant as a food source for the lesser long-nosed bat, compared to the hundreds of thousands of mature saguaros available in the general area. The Service therefore concurs that the proposed project, as described, is not likely to adversely affect the lesser long-nosed bat.