AESO/SE
2-21-01-F-415 March 1, 2002

Ms. Catherine Ripley
Natural and Cultural Resources Manager
Arizona Department of Emergency
and Military Affairs Joint Programs
5636 East McDowell Road, Building M5330
Phoenix, Arizona 85008-3495

Dear Ms. Ripley:

This biological opinion responds to your request for consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation was dated August 13, 2001, and received by us on August 17, 2001. At issue are the possible effects of ongoing military activities and the proposed firing box additions at the Florence Military Reservation (FMR) in Florence, Pinal County, Arizona on the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), and desert pupfish (*Cyprinodon macularius*) pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*). The Arizona Army National Guard (AZ ARNG) requests formal consultation in regard to the pygmy-owl and our concurrence that the proposed action may affect, but is not likely to adversely affect, the lesser long-nosed bat. AZ ARNG found that the proposed actions would not affect the endangered desert pupfish. Although AZ ARNG is a state agency, it carries out federal activities and receives federal funding, which constitutes a federal nexus.

This biological opinion is based on information provided in the your August 13, 2001, request for consultation, your biological assessment (BA) (Harris Environmental Group 2001*a*) and amendment, a site visit, meetings, electronic messages, and information in our files. A complete administrative record of this consultation is on file at this office. Our concurrence with your determination that the proposed action may affect, but is not likely to adversely affect, the lesser long-nosed bat, is included in Appendix 1 of this opinion.

CONSULTATION HISTORY

Your BA was received by us in December 2000, following which, meetings between AZ ARNG and Service personnel occurred on January 4, 2001, and February 15, 2001, regarding the effects of ongoing military activities and the addition of new firing boxes on the pygmy-owl. AZ ARNG

requested formal consultation be initiated in a letter dated May 29, 2001. An updated BA was also submitted in May 2001. However, on June 13, 2001, AZ ARNG asked that formal consultation be discontinued and requested concurrence from the Service that the proposed action may affect, but is not likely to adversely affect the pygmy-owl. After several conversations with Service personnel, AZ ARNG reentered formal consultation on August 13, 2001.

In a meeting on November 2, 2001, the Service requested from AZ ARNG additional information necessary to complete consultation. The 135-day period allowed for the completion of the consultation process ended on December 24, 2001. However, on January 8, 2002, the Service requested a 60-extension to this period, to allow time for AZ ARNG to submit the necessary information and for the Service to complete this biological opinion. On February 15, 2002, we received this information in an amendment to your BA.

On July 3, 2001, AZ ARNG requested the Service's comments on their draft Integrated Natural Resources Management Plan (INRMP) and associated Environmental Assessment in order to comply with the provisions of the Sikes Act (16 U.S.C. 670 *et seq*.). In October 2001, the Service, under Regional direction, provided comments on these documents. The final INRMP for FMR was signed on November 15, 2001.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Ongoing military activities

AZ ARNG proposes to continue conducting military operations at FMR. Current military uses of FMR include the following:

1. Artillery unit practice and live-fire exercises (including illumination, high explosive, and white phosphorous rounds) using both tracked and wheeled 155 mm howitzers and support vehicles restricted within 123-acre firing boxes, measuring 1,640 x 3,280 feet. Eight firing boxes currently exist (numbers 100 - 800) and are located in the northern part of FMR. Firing is directed into a designated impact area located to the south.

2. Other military unit operations, such as engineering, transportation, military police, and aviation (helicopter) units.

3. Small weapons firing consisting of pistols, rifles, light anti-tank weapons, grenade launchers, and light machine guns within the developed Small Arms Range Complex in the southern part of FMR.

4. Practice training for Nuclear, Biological, and Chemical operations using personal protective equipment inside an enclosed building within the developed Small Arms Range Complex in the southern part of FMR.

5. Compass and map reading within a developed, land navigation course for foot soldiers on reservation lands.

6. Military vehicle operations using both tracked and wheeled vehicles, limited to designated trails throughout FMR, and equipment and ammunition storage sites on adjacent land to the south and west of FMR.

FMR is divided into 10 training areas (Figure 1). Military use within each of the training areas is described in Table 1. Other organizations that use the training facilities on FMR include: the Boy Scouts of America, Junior Reserve Officer Training Corps, Reserve Officer Training Corps, Navy Reserves, Marine Corps Reserves, US Army active-duty units, Motorola, and Boeing (formerly McDonnell-Douglas). Additionally, local law enforcement agencies use small arms ranges at FMR to meet their individual weapons qualification requirements. During Fiscal Year 2000, FMR was used 22,962 Guard Man-Days by AZ ARNG personnel and 2,620 Guard Man-Days by other non-military groups.

Proposed firing box additions

AZ ARNG also proposes to develop six new firing boxes in the northern (Area B) portion of FMR, because of an increase in the number of artillery units (Figure 1). The eight existing firing boxes encompass 984 acres and development of the six new firing boxes would add 738 acres for a total of 1,722 acres within firing boxes. Four new firing boxes (900, 1000, 1300, 1400) have established access trails leading to the periphery. The two remaining new firing boxes, 1100 and 1200, would require new trails.

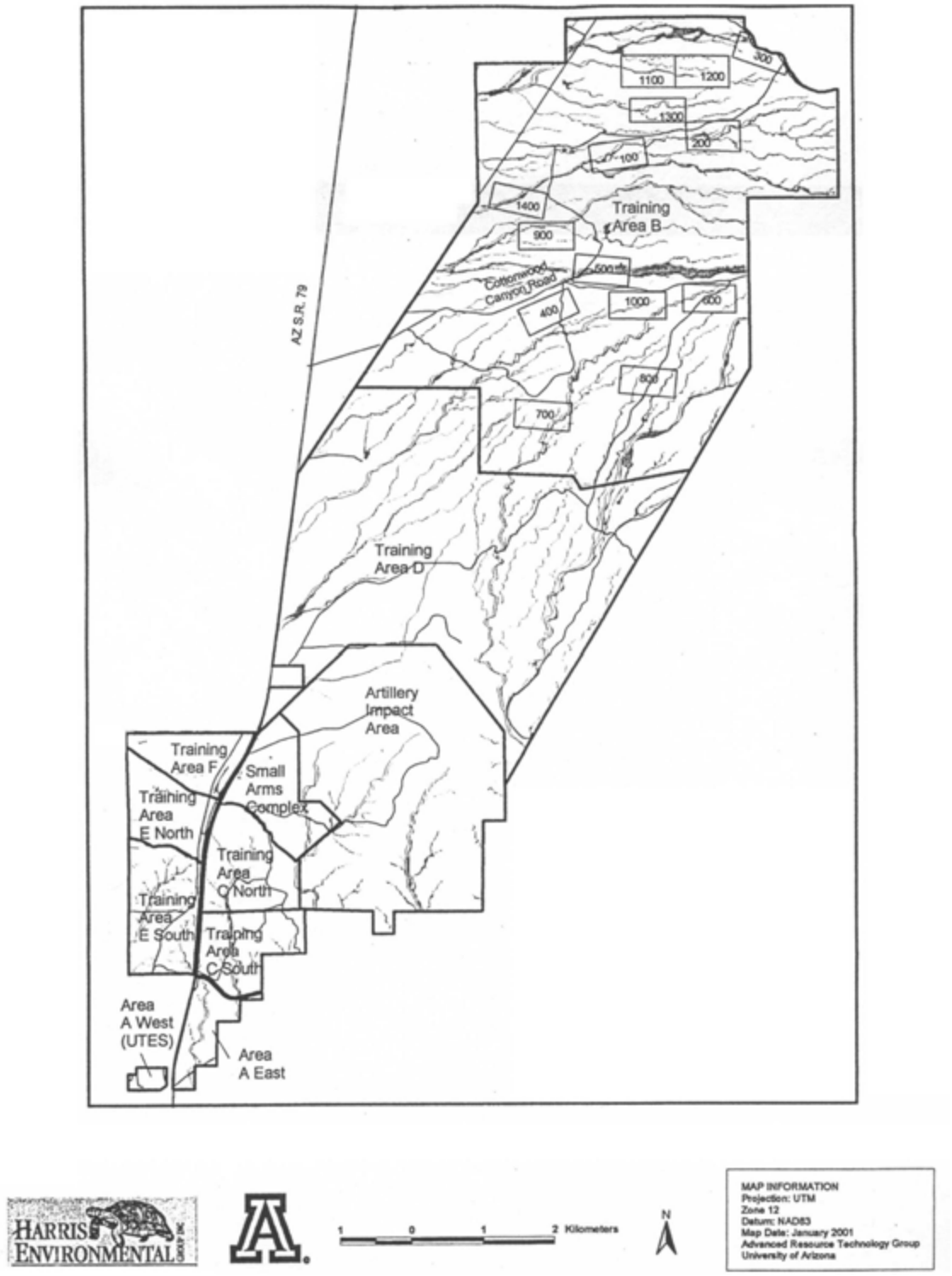
Pygmy-Owl Conservation Measures

AZ ARNG also proposes the following conservation measures to reduce the impacts of ongoing military training and future firing box development on the pygmy-owl:

<u>Continued Surveys</u>

In the spring, the surveys will begin in the earlier part of the survey season (January March) to cover pair bonding, courtship, and early nesting periods. Previous surveys that have included this time period have resulted in the detection of birds that were not detected later in the same season (Abbate and Wilcox 2000, Harris and Duncan 1999). Because FMR military activity is

Figure 1. Military use areas and locations of existing (100-800) and proposed (900-1400) firing boxes at Florence Military Reservation, Pinal County, Arizona.



on-going in the spring months while surveys are being conducted, additional fall surveys will be conducted. These surveys will be conducted in mid-September through mid-October to determine if pygmy-owls have dispersed to FMR.

Table 1. Military Training Area Use.

Training Area	Activities	Usage
A (West)	Year-round usage (day-to-day operations). Weekend and annual training September May, rare usage June August.	28 days (approximately) during September May, with an average of 350 personnel training each day. Typically 2 battalions use the area on separate weekends each month.
A (East)	Similar days as Area A West. In addition, Area A East has bivouac use 2 weekends per year.	4 days/year. Bivouac usage occurs when the need arises, months of usage vary.
Area B	Similar to Area A (West). All firing boxes are located here. On average 3 firing boxes are used during weekend operations. Recreational usage.	~55 vehicles/year (artillery and support vehicles) travel Cottonwood Canyon trail or the Main Supply Route (crossing Area D) to firing boxes in Area B. Travel and site usage is limited to trails and firing boxes.
C (South)	The Nuclear, Biological, and Chemical (NBC) Chamber is located here.	Low, used 1 weekend per month, ~18 days/year.
C (North)	Small arms ranges for military, prison, police training. Weekend training September May and similar as Area A.	Military use ~ 48 days/year. Prison, police personnel (civilian) ~ 2 days/week or 104 days/year.
Area D	Artillery and support vehicles cross during training weekends (September May). Occasional maintenance work.	Same as in Area A.
E (South)	Medical Battalion training and land navigation courses.	7 days/year for each.
E (North)	Bivouac training and helicopter training.	Extensively used during weekends (September May) and same as Area A.
Area F	Similar to Area E, but primarily bivouac training.	Extensively used during weekends (September May) and same as Area A.
Artillery Impact Area	Artillery target area. Observation posts used to monitor firing into impact zones. Occasional maintenance.	Similar to Area A (September May).

Surveying efforts will be scheduled on FMR such that military activities and pygmy-owl surveys do not occur simultaneously. If pygmy-owls are detected on the FMR (from either the fall or spring surveys), the Service will be notified and restrictions that apply to activities in an occupied territory will be followed. In addition, if a pygmy-owl is located within a 19-mile buffer area or

within FMR, AZ ARNG will re-initiate consultation with the Service and reevaluate direct, indirect, and cumulative effects of ongoing military activity on the species.

Little information exists regarding dispersal patterns of young pygmy-owls in Arizona. AZ ARNG and AGFD are currently cooperating in a study aimed at identifying dispersal patterns and habitat requirements of pygmy-owls. Such information will better enable resource managers to develop management prescriptions that ensure the future viability of pygmy-owls in Arizona.

Habitat mitigation

There are several mitigation measures that will be conducted to protect existing habitat and enhance degraded areas that have potential to become habitat for pygmy-owls. These are:

Trail stabilization and erosion control measures

Military vehicle use of major trails (e.g., Main Supply Route and Horne Trail) leading to the existing firing boxes causes increased soil erosion from water and wind agents. Loss of soil and alteration of surface water flows negatively effect vegetation communities. AZ ARNG will identify disturbed areas on trails and provide stabilization and erosion control measures. A yearly management program will be implemented and reported to the Service.

Conservation within existing firing boxes

Unrestricted military vehicle maneuvering within the eight existing firing boxes (100 - 800) creates two areas of avoidable disturbance: (1) non-essential trails and (2) desert washes. To reduce disturbance within firing boxes, AZ ARNG will close non-essential trails and restrict military vehicle access from desert washes and an adjacent 50 m-wide (164 feet) buffer area on either side of the wash. Non-essential trails will be vegetated (see revegetation guidelines below).

Development of new firing boxes

AZ ARNG will study the placement of the current and proposed boxes, as well as the military use within each of the boxes. Further, AZ ARNG will work in conjunction with AGFD and the Service to determine relative habitat quality, as it pertains to pygmy-owls, within existing firing boxes and areas proposed for new firing boxes. Based on these analyses, AZ ARNG will determine which areas would best be utilized for military use. For example, if portions of existing firing boxes contain high-quality pygmy-owl habitat, these areas will be decommissioned. Military activities previously occurring in these areas will be relocated to areas of lower habitat quality. Decommissioned areas will be revegetated.

For approved firing boxes that have not yet been developed, the number of acres that will be disturbed (including roads to the box and disturbance within the box) will be compensated; an

equal number of acres will be decommissioned and revegetated. AZ ARNG Environmental Office personnel will work with the Service, AGFD, and Arizona State Land Department (ASLD) to determine which areas will be revegetated. Areas that will continue to be used regularly for military or recreational use will not be revegetated. AZ ARNG will also work with ASLD to determine the need and ability to place fencing around revegetated areas.

The following guidelines will be used for revegetated areas:

1. Native plant species of the same density and diversity as undisturbed areas immediately surrounding the disturbed site will be used. AZ ARNG biologists will sample adjacent vegetation communities for species diversity, cover, and abundance. AZ ARNG will review revegetation plans with Service and AGFD biologists.

2. Transplanted or nursery stock trees will have a 3-year survival guarantee. Any trees that die during this period will be replaced.

3. Revegetated areas will be irrigated at a level appropriate for the location and species.

4. AZ ARNG will design a study that will examine the success of revegetated areas to ensure the most efficient techniques and locations are being used.

STATUS OF THE SPECIES

A detailed description of the life history and ecology of the cactus ferruginous pygmy-owl 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 and Finch 2000), and other information available at the Arizona Ecological Services Field Office. Information specific to the pygmy-owl in Arizona is limited. Research in Texas has provided useful insights into the ecology of the subspecies, and in some instances represents the est available information; however, habitat and environmental conditions are somewhat different in Arizona and conclusions based on Texas information are tentative.

Species description

The Service listed the Arizona population of the pygmy-owl 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 pygmy-owl. On July 12, 1999 we designated approximately 731,712 acres of 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]). However, on September 21, 2001, the U.S. District Court for the District of Arizona vacated this final rule designating critical habitat for the pygmy-owl, and remanded its designation back to the Service for further consideration.

Life history

Pygmy-owls are small birds, averaging 6.75 inches in length. Pygmy-owls are reddish-brown overall, with a cream-colored belly streaked with reddish-brown. The pygmy-owl 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 pygmy-owls, such as: riparian woodlands, mesquite (*Prosopis* spp.) "bosques (Spanish for woodlands), Sonoran Desert scrub, and mesquite/shrub invaded 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 feet. Historically, pygmy-owls were associated with riparian woodlands in central and southern Arizona. Plants present in these riparian communities include, cottonwood (*Populus* spp.), 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 pygmy-owl. 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, pygmy-owls have been primarily found in the Arizona Upland Subdivision of Sonoran Desert scrub (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 1999, Johnson and Haight 1985, Johnsgard 1988). However, over the past several years, pygmy-owls have also been found in riparian and xeroriparian habitats and semidesert grasslands as classified by Brown (1994). Desert scrub communities are characterized by an abundance of saguaros or large trees, and a diversity of plant species and vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. Semidesert grasslands have experienced the invasion of velvet mesquites (*Prosopis velutina*) in uplands and linear woodlands of various tree species along bottoms and washes.

The density of trees and the amount of canopy cover preferred by pygmy-owls 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, pygmy-owls 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.* 2000*a*), higher vegetation diversity is found more often at nest sites than at random sites (Wilcox *et al.* 2000).

Pygmy-owls typically hunt from perches in trees with dense foliage using a perch-and-wait strategy; therefore, sufficient cover must be present within their home range for them to successfully hunt and survive. 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 pygmy-owl's prey base. Shrubs and large trees also provide protection against aerial predation for juvenile and adult pygmy-owls and cover from which they may capture prey (Wilcox *et al.* 2000).

Pygmy-owls are considered non-migratory throughout their range by most authors, and have been reported during the winter months in several locations, including Organ Pipe Cactus National Monument (OPCNM) (R. Johnson unpubl. data, T. Tibbitts, OPCNM unpubl. data). Pygmy-owls 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 feet 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 of dispersing juveniles in Arizona during 1999 and 2000 ranged from 1.4 to 12.9 miles (straight line distance) (n=6, mean 6.2 miles) in 1999, and 1.6 to 11.7 miles (n=6, mean 5.8 miles) in 2000 (S. Richardson and M. Ingraldi, AGFD unpubl. data). Pygmy-owl telemetry studies have documented movement of owls between southern Pinal County and northwestern Tucson (S. Richardson and M. Ingraldi, AGFD unpubl. data). Juveniles typically dispersed from natal areas in July but did not appear to defend a territory until September. They may move up to one mile in a night; however, they typically fly short distances 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 pygmy-owls are in the same general location as last observed the preceding fall.

Apparently unpaired females may also remain in the same territory for some period of time. In the spring of 2001, an unpaired female (the male died in 2000) remained in its previous years' territory well into the spring, exhibiting territorial behavior (calling) for 2 months until ultimately switching territories and paring with an unpaired male and successfully nesting (S. Richardson, AGFD unpubl. data). Researchers suspect that if this unpaired female could have attracted an unpaired male during that time, she would have likely remained in her original territory. Apparently at some point the urge to pair is too strong to remain and they seek out new mates.

In Texas, Proudfoot (1996) noted that, pygmy-owls used between 3 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 pygmy-owls. Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 - 2,000 feet. Initial results from ongoing studies in Texas indicate that the home range of pygmy-owls may also expand substantially during dry years (G. Proudfoot unpubl. data).

Species status and distribution range wide

The pygmy-owl is one of four subspecies of ferruginous pygmy-owl. Pygmy-owls 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. Recent genetic studies suggest that ferruginous pygmy-owl populations in southern Arizona and southern Texas are distinct subspecies, and that there is no genetic isolation between populations in the United States and those immediately south of the border in northwestern or northeastern Mexico (Proudfoot and Slack 2001). Results also indicate a comparatively low haplotypic diversity in the northwestern Tucson population, suggesting that it may be recently separated from those in the Altar Valley, Arizona, and in Sonora and Sinaloa, Mexico.

The Service is currently funding habitat studies and surveys in Sonora, Mexico to determine the distribution and relative abundance of the pygmy-owl there. Based on the lack of sightings, they may be rare or uncommon in northern Sonora, Mexico (Hunter 1988, USFWS 1997). Preliminary results indicate that pygmy-owls 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 DPS of the pygmy-owl extends from the International Border with Mexico north to central Arizona. The northernmost historic record for the pygmy-owl is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the pygmy-owl to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, the pygmy-owl, prior to the mid-1900s, was "not uncommon," "of common occurrence," and a "fairly numerous" resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Additionally, pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (AGFD unpubl. data, Hunter 1988).

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

Hunter (1988) found fewer than 20 verified records of pygmy-owls in Arizona for the period of 1971 to 1988. Formal surveys for the pygmy-owl on OPCNM began in 1990, with one located that year. Beginning in 1992, survey efforts conducted in cooperation with the AGFD, located three single pygmy-owls on OPCNM (USFWS and OPCNM, unpubl. data). In 1993, surveys were conducted at locations where pygmy-owls had been sighted since 1970. Only one pygmy-owl was detected during these survey periods, and it was located in northwestern Tucson (Felley and Corman 1993). In 1994, a pair and single owl of unknown breeding status were located in northwestern Tucson during informal survey work by AGFD (Abbate *et al.* 1996). In 1995, AGFD confirmed 5 adult pygmy-owl and one juvenile, one of which was the first nest in many years. In 1996, AGFD focused their survey efforts in the Tucson Basin. A total of 12 pygmy-owls were detected, including one known nesting pair and their 2 fledglings, which successfully fledged. Three additional pygmy-owls and three other unconfirmed reports were also recorded at OPCNM in 1996.

While the majority of Arizona pygmy-owl detections in the last seven years have been from the northwestern Tucson area in Pima County, pygmy-owls have also been detected in southern Pinal County, at OPCNM, Cabeza Prieta National Wildlife Refuge (CPNWR), Buenos Aires National Wildlife Refuge (BANWR), and on the Coronado National Forest. The following is a brief summary of recent owl numbers and distribution[1]:

In 1997, survey efforts of AGFD located a total of five pygmy-owls 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 these owls, one pair successfully fledged two young which were banded. 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 and, as a result, more pygmy-owls were documented, which may at least in part account for a larger number of known owls. In 1998, a total of 35 pygmy-owls were confirmed (S. Richardson, AGFD unpubl. data, USFWS unpubl. data, T. Tibbitts, OPCNM unpubl. data, D. Bieber, Coronado National Forest unpubl. data).

In 1999, a total of 41 adult pygmy-owls were found in Arizona at 28 sites. Of these sites, 11 had nesting confirmed by AGFD and the Service. Pygmy-owls were found in three distinct regions of the state: Tucson Basin, Altar Valley, and OPCNM. Almost half of the known owl sites were in the Altar Valley. 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).

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[1] To a large degree, survey effort plays an important factor in where owls have been documented. Survey effort has not been consistent over the past several years in all areas of the state, affecting the known distribution and numbers of owls in any particular area.

It is unclear what the survival rate for pygmy-owls is; however, as with other owls and raptors, a high mortality (50% or more) of young is typical during the first year of life.

Surveys conducted in 2000 resulted in 24 confirmed pygmy-owl sites (i.e. nests and resident pygmy-owl sites) and several other unconfirmed sites (S. Richardson, AGFD unpubl. data, T. Tibbitts, OPCNM unpubl. data, USFWS unpubl. data). A total of 34 adult pygmy-owls were confirmed. Nesting was documented at 7 sites and 23 fledglings were confirmed; however, as in 1999, over a 50% 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 was unknown; however, they were presumed dead.

Surveys conducted during the recently completed 2001 season resulted in a total of 46 adult pygmy-owls confirmed at 29 sites[2] in Arizona (S. Richardson, AGFD unpubl. data, T. Tibbitts, OPCNM unpubl. data, USFWS unpubl. data). There were also several other unconfirmed sites that are not included in these totals. Nesting was documented at 17 sites; it is unknown at this time how many young have successfully fledged. The following regions of the state are currently known to support pygmy-owls:

Tucson Basin (northwestern Tucson and southern Pinal County) - A total of 8 adults (3 pairs and 2 single males) were confirmed at 5 sites, all of which were in Pima County. For the first time in 3 years, no pygmy-owls were documented in southern Pinal County. Three nests in northwestern Tucson were confirmed, all with young.

Altar Valley - A total of 19 adult pygmy-owls were documented at 12 sites. As a result of increased access to portions of the valley, the number of known owls increased to 7 pairs and 5 resident single owls. A total of 7 nests were confirmed.

OPCNM and CPNWR - Ten adults, consisting of 3 pairs and 4 single pygmy-owls were confirmed at 7 sites. Three nests were active. Two new sites were documented on the CPNWR.

Other - A total of 9 adults, consisting of 4 pairs and 1 single pygmy-owl at 5 sites documented elsewhere in southern Arizona. Nesting was confirmed at 4 of these sites. It is unknown how many of these young successfully dispersed. There were several other possible pygmy-owl detections reported elsewhere in the state, but they were not confirmed.

One factor affecting the known distribution of pygmy-owls 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

[2] Pygmy-owl sites are nests and resident male pygmy-owl sites that have been confirmed by AGFD or the Service.

these areas are where most owl locations have been recorded. However, over the past three years, large, previously unsurveyed areas have been inventoried for owls, resulting in a much wider distribution than previously thought. As a result, our knowledge is changing as to pygmy-owl distribution and habitat needs as new information is collected. 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 pygmy-owls in the state was in northwestern Tucson. However, in 1999, after extensive surveys in Altar Valley, more owls were found there (18 adults) than in northwestern Tucson (11 adults), although until 2001, there have been fewer nest sites in Altar Valley than in the Tucson Basin (S. Richardson, AGFD unpubl. data).

Rangewide trend

One of most urgent threats to pygmy-owls in Arizona is thought 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 directly and indirectly impacts pygmy-owl 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 pygmy-owl 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, pygmy-owls, 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 pygmy-owls is a factor in the increasingly fragmented landscapes that exists in the action area. For example, researchers have been closely monitoring an established pygmy-owl site (documented each year since 1996) in which the male died in 1999, apparently from a collision with a fence (S. Richardson, AGFD unpubl. data.). This site was not known to be occupied since 1999. 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 continue to be monitored to determine if new owls reestablish a nest site.

In northwestern Tucson, all currently known pygmy-owl 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. Pygmy-owls 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 pygmy-owls in areas with an abundance of native vegetation indicates that a complete modification of natural conditions likely results in unsuitable habitat conditions for pygmy-owls. 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 that minimize 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 pygmy-owl habitat include the destruction of riparian bottomland forests and bosques. It is estimated that 85 to 90% of low-elevation riparian habitats in the southwestern U.S. have been modified or lost; these alterations and losses are attributed to woodcutting, non-native plant invasion, 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, Stromberg and Chew 1997). 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 pygmy-owl 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 pygmy-owl 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 1999, Johnson-Duncan *et al.* 1988, Millsap and Johnson 1988, Monson 1998). A very low number of pygmy-owls in riparian areas in recent years may reflect the loss of habitat connectivity rather than the lack of suitability (Cartron *et al.* 2000*b*).

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

One of the few areas in Texas known to support pygmy-owls continues to be widely publicized as having organized field trips and birding festivals (American Birding Association 1993, Tropical Birds of the Border 1999). Resident pygmy-owls are found at this highly visited area only early in the breeding season, while later in the season they 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 habituate to the playing of taped calls and stopped responding, or if they abandoned the area. Oberholser (1974) and Hunter (1988) additionally indicated that in southern Texas recreational birdwatching may disturb owls at highly visited areas.

Human activities near nests at critical periods of the nesting cycle may cause pygmy-owls to abandon their nest sites. In Texas, 3 of 102 pygmy-owl nests monitored from 1994-1999 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 pygmy-owls 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).

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).

Application of pesticides and herbicides in Arizona occurs year-round, and these chemicals pose a potential 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).

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. In Texas, eggs and nestlings were depredated by racoons (*Procyon lotor*) and bullsnakes (*Pituophis catenifer*). Both adult and juvenile pygmy-owl 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). Pygmy-owls are particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999). Therefore, cover near nest sites may be important for young to fledge successfully (Wilcox *et al.* 1999, Wilcox *et al.* 2000). Although nest depredation has not been recorded in Arizona, only a few nests have been monitored (n = 21 from 1996-1999). Additional research is needed to determine the effects of predation, including nest depredation, on pygmy-owls in Arizona and elsewhere.

Another factor that may affect pygmy-owls is interspecific competition/predation. In Texas, depredation of two adult female pygmy-owls nesting close to screech-owls was recorded. These incidences were recorded as "depredation by screech-owl after examination of the pygmy-owl corpses and assessment of circumstances (i.e., one pygmy-owl attempted to nest in a box that was previously used as screech-owl roost site, the other established a nest in a box within 16 feet of screech-owl nest site). In 2001, an unpaired female pygmy-owl was found dead in a tree cavity, apparently killed by a screech-owl (S. Richardson, AGFD unpubl. data). Conversely, pygmy-owls and screech-owls have also been recorded successfully nesting within 7 feet of each other in

the same tree without interspecific conflict (G. Proudfoot, unpubl. data). The relationship between pygmy-owl 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 pygmy-owls are located. Pygmy-owls flying into windows and fences, resulting in serious injuries or death to the birds, have 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 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 pygmy-owl nest. In Texas, two adult pygmy-owls and one fledging were killed by a domestic cat. These owls used a nest box about 246 feet from a human residence. 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.

Because pygmy-owls have been observed moving around the perimeter of golf courses, avoiding non-vegetated areas, roads and other openings 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 pygmy-owls 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 pygmy-owls by altering their habitat (Abbate *et al.* 1999). A recent fire altered habitat near an active pygmy-owl 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, Esque *et al.* 2000). Flesch (1999) also noted that approximately 20 to 30% of the mesquite woodland within 164 feet of the nest was fire- or top-killed, and ground cover was also eliminated until the summer monsoons. Careful use of prescribed fires in areas potentially suitable for pygmy-owls 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) further 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 7 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 pygmy-owls 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 pygmy-owl is nonmigratory, there may be an additional limitation on the flow of genetic material among populations, which may reduce the chance of demographic and genetic rescue via 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 pygmy-owls 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 pygmy-owl, 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.

Definition of the Action Area

The proposed actions may directly affect the entirety of FMR. However, 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). Therefore, the action area consists of FMR plus a 19 mile buffer area. The 19-mile buffer area is based upon the dispersal distance of juvenile pygmy-owls in Texas and Arizona (Proudfoot unpubl. data, S. Richardson, AGFD unpubl. data). Land jurisdiction and ownership of the 19-mile buffer surrounding FMR consists of private properties, municipalities, State lands, and Bureau of Land Management (BLM) lands.

Action Area - Climate, Terrain, and Vegetation Communities

Topographically, the FMR consists of gently sloping, to nearly flat alluvial fan slopes and terraces, with several basalt hill outcrops. Rugged, broken terrain with low ridges and confined washes are located within the eastern and southern portions of the FMR. Elevation ranges from 1,490 feet near the Gila River up to 2,260 feet in the foothills of the Mineral Mountains. FMR contains several washes, which flow ephemerally south to the Gila River. Surface water resources include four man-made stock tanks.

Both the Lower Colorado River Valley and the Arizona Upland subdivisions of the Sonoran Desert scrub vegetation community (Brown 1994) occur on FMR. The Arizona Upland subdivision is represented in the northern portion of FMR, as well as on alluvial slopes, rugged ridges, and basalt hills in the eastern and south-central portions (Spencer and Humphrey 1999).

There are several xeroriparian areas on FMR, however, none contain obligate riparian species. The plant species in the washes were similar to the surrounding uplands, but exhibit more vigorous and robust growth forms.

Status of the Cactus Ferruginous Pygmy-Owl in the Action Area

There are no historical or current records of pygmy-owls at FMR. The first Pinal County pygmy-owl record was of a female collected by Edgar A. Mearns on May 10, 1885, in Casa Grande (Mearns 1885, Fisher 1893). Subsequent Pinal County records included M. French Gilman's 1908 specimens collected at Blackwater and an egg set of 4 at Sacaton, both localities on the Gila River Indian Reservation (Gilman 1909).

As of 2000, pygmy-owls in Pinal County were primarily located just north of the Pima County border (Abbate 1996, Duncan *et al.* 1998, Harris and Duncan 1998, Abbate *et al.* 1999). During 1998, contractors for the Service identified two distinct pygmy-owl territories on Arizona State Trust Land east of Red Rock between the Tortolita and Picacho mountains in southern Pinal County (Duncan *et al.* 1998, Harris and Duncan 1998). In 2000, a BLM contractor detected a single owl along Coronado Wash on BLM land. Coronado Wash is north of Parker Wash and about 25 miles southeast of Florence. Other relatively recent Pinal County records were made by AGFD during 1996 and 1997 on State Trust Land and private land just north of Marana (Abbate 1996, Abbate *et al.* 1999).

AZ ARNG has conducted pygmy-owl surveys for the past 4 years (1997-2000). In 2000, surveys were conducted in accordance with the revised 2000 survey protocol (USFWS 2000). Earlier surveys were conducted using the revised Corman methodology (Corman 1993, Spencer and Humphrey 1999). While FMR contains the habitat type associated with most current day pygmy-owl locations, no pygmy-owl individuals have been detected during these survey efforts.

In 1997 -1998, pygmy-owl surveys were conducted by AZ ARNG biologists (Spencer and Humphrey 1999). Surveys were conducted within and adjacent to seven existing firing boxes, cattle tanks, and the Black and Dozer hills. In 1998, surveys were conducted within and adjacent to six existing firing boxes and four new locations that included a cattle tank and several wash reaches. In 1999 and 2000, surveys were conducted by AGFD (Abbate *et al.* 2000, Abbate and Wilcox 2000). The 1999 surveys were conducted near the six proposed locations for new firing boxes, in addition to six of the existing firing boxes.

The 2000 surveys were conducted in the northern portion of FMR and were limited to locations within and adjacent to the existing and proposed firing boxes. Survey routes followed ephemeral washes and drainages associated with high vegetation structural diversity. Although the 2000 survey efforts covered much of the same area previously surveyed in 1998 and 1999, calling transects were located in areas of potentially suitable pygmy-owl habitat along the entire length of the firing boxes in an effort to establish a more complete calling coverage of these training areas (Abbate and Wilcox 2000).

No pygmy-owls were detected by AGFD during the 2000 survey; however, four other owl species were detected, including the common barn owl (*Tyto alba*), great horned owl (*Bubo virginianus*), elf owl (*Micrathene whitneyi*), and western screech owl (*Otus kennicottii*). The presence of these owl species (especially the elf owl and western screech owl) suggest habitat components suitable for pygmy-owls (prey base and cavity nesting opportunities) are present on FMR.

High-grade pygmy-owl habitat is defined as Sonoran riparian deciduous forest and woodland (e.g. cottonwood-willow, mesquite, and other similar associations as defined by Brown *et al.* [1979]). High-grade pygmy-owl habitat also includes Sonoran Desert scrub, especially areas with high species and structural diversity below 4,000 feet in elevation.

High-grade pygmy-owl habitat at FMR exists within the Arizona Uplands subdivision, especially in xeroriparian areas with relatively high plant density. Areas on FMR within the Lower Colorado River Valley subdivision are not considered high-quality pygmy-owl habitat because this plant association does not typically provide suitable foraging, nesting, or roosting habitat. Also excluded from the definition of high-quality pygmy-owl habitat are portions of FMR within the Arizona Uplands subdivision that do not contain dense and diverse vegetation. Using this definition, high-grade pygmy-owl habitat is found in the northern part of FMR and consists of almost all of Area B and the northern half of Area D. High-grade habitat constitutes 12,278 acres (or 47%) of FMR.

Past and Ongoing Actions Affecting the Cactus Ferruginous Pygmy-Owl in the Action Area

FMR was established in 1912. Land use within the southern portion of FMR included development of a rifle range, prisoner of war camp, and a Federal detention center for immigrants. The majority of past military activities have occurred within the southern portion of FMR (Areas A, C, E, F, and Small Arms Complex). Areas within this portion of FMR have been developed, habitat has been modified, and ongoing military training continues to degrade habitat. The northern portion of FMR, which contains high-grade pygmy-owl habitat, remains largely undeveloped. Past impacts and disturbances in this area consist of military training, recreational use, and cattle grazing.

Almost all of Area B and the northern portion of Area D consist of high-grade pygmy-owl habitat. The eight existing firing boxes are located within Area B and encompass a total of 984 acres. Aerial photographs taken in 2000 were used to determine the number of acres of disturbance within these boxes. Photos were analyzed for signs of bare ground, roads, and trails. Areas beyond firing box boundaries were not analyzed. Disturbed areas were delineated using ArcView. Through these analyses it was determined that of the total 984 acres, 174.8 show signs of disturbance. However, some of this disturbance is attributable to non-military activities, such as recreation. Areas disturbed due to military versus non-military activities could not be differentiated by the use of aerial photos. Within Area D, the disturbance is limited to trails or unimproved roads.

ASLD trust land is located in the northern portion of FMR. Normal weekday activities on trust land are non-military and are regulated by ASLD. Use of state land by AZ ARNG is arranged through 1) a special land use permit with temporal limits (1-2 weekends per month and 2-week training periods on an annual basis) and land-area limits, and 2) a commercial lease of an area serving as the northern safety buffer to the artillery impact area in the southern part of FMR. Public access onto State lands on FMR is unrestricted except during military activities. Recreational pressures include hunting, camping, and off-road vehicle use. Cottonwood Canyon Trail (an unimproved road) provides east-west access from Arizona State Route (SR) 79 to Box Canyon, a popular recreation area. Campers use the training areas as campsites, particularly firing boxes 300, 500, and 600, which are located near graded and county-maintained trails.

Recreational use of FMR may result in further habitat degradation, increased threat of wildfire, and disturbance to pygmy-owls due to human presence, if pygmy-owls occupy the area. The numbers of recreational users at FMR is unknown; however, one of the private users is the Arizona State Association of Four-Wheel Drive Clubs, which holds its annual jamboree at FMR. The jamboree is typically staged over 1 weekend in October and approximately 2,000 people attend.

Degradation due to livestock grazing constitutes another past and ongoing impact to pygmy-owl habitat on FMR (Center for Ecological Management of Military Lands 1997). Currently there are no grazing leases, however, cattle are still present on FMR. These cattle are either strays or are there illegally. AZ ARNG does not have jurisdiction over stray cattle within pygmy-owl habitat in the northern portion of FMR; as the northern portion of FMR is primarily State trust land, ASLD has jurisdiction over cattle in this area.

Recreation and grazing impacts occur on lands adjacent to FMR and within the 19-mile buffer area (which constitutes the limits of the action area), and these actions will likely continue to contribute to habitat degradation within the action area. The northern portion of FMR is bordered by State lands, except for part of the eastern boundary, which is bordered by BLM land. Near the southern boundary of FMR, a few parcels of privately owned parcels occur and are primarily managed for grazing.

EFFECT OF THE ACTION

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

Although 47% of FMR consists of high-grade pygmy-owl habitat, no pygmy-owls have been located during 4 consecutive years of surveys (1997-2000). However, in 2000, a pygmy-owl was detected within 25 miles of Florence. Given a dispersal distance of up to 19 miles (Proudfoot unpubl. data, S. Richardson, AGFD unpubl. data) by juvenile pygmy-owls, the potential exists for future occupancy of suitable habitat within FMR. Further, pygmy-owl habitat on FMR represents a potential breeding area, as well as a linkage to the northem portion of the historical range of the subspecies. Expansion of the current pygmy-owl range and the maintenance of linkages connecting occupied and potential habitat are critical to the subspecies' recovery and continued existence in Arizona.

The use of the proposed firing boxes would be the same as that occurring in the existing boxes, thereby creating additional degraded areas within high-grade pygmy-owl habitat. AZ ARNG will, however, calculate the acreage of disturbance that will occur within proposed firing boxes and will compensate for this by decommissioning areas within existing firing boxes. Decommissioned areas will be revegetated. Therefore, the total number of disturbed acres will not increase when the proposed firing boxes are developed.

Frequent military vehicle use of trails within existing firing boxes may result in increased erosion, which may lead to the alteration of surface water flows and negative effects to

vegetation communities. However, AZ ARNG proposes to identify disturbed areas on major (essential) trails and provide stabilization and erosion control measures. Further, trails deemed nonessential will be closed and revegetated. Military activities within the existing firing boxes may also lead to disturbance of washes and associated vegetation. AZ ARNG proposes to restrict military vehicle access from desert washes and an adjacent 164 foot-wide buffer area on either side of washes.

Military training operations at FMR, in particular live-fire exercises, increase the risk of wildfire. Fires can adversely affect pygmy-owls by altering their habitat (Abbate *et al.* 1999). Wildfire may impact pygmy-owl habitat by reducing the number of potential nest sites. In addition to direct mortality of saguaros, post-fire mortality may also occur. Many desert shrubs and cacti, including saguaro, are poorly adapted to fire and decline in burned areas. Esque *et al.* (2000) reported mortality of adult saguaros in excess of 20% after a fire in desert scrub at Saguaro National Park. Additional impacts from wildfire may result from the loss of ground cover and the subsequent reduction in prey abundance. Most previous wildfires on FMR, however, have been small and contained within the Impact Area in the southern portion of reservation, outside of pygmy-owl habitat (Harris Environmental Group 2001*b*).

In addition to habitat alteration, a potential effect to pygmy-owls, should they occupy the action area, is that of disturbance from noise and human presence. Noise disturbance during the breeding season may lead to nest abandonment and thereby reduce productivity. Disturbance outside of this period may affect energy balance and survival. Based on the best available scientific information, it appears this species may be tolerant, at least to some extent, of certain low-level noise disturbances associated with human activity. These disturbances include daily activities in residential areas such as people walking, voices, children playing, horses and other livestock, dogs, low to moderate vehicle and large truck traffic, and some occasional construction equipment activity. The threshold between noise levels and types of activities that a pygmy-owl can tolerate versus those that will cause it to leave an area is not clearly known at this time. Further, the presence of humans and associated noises may be a deterrent to the establishment of territories by dispersing pygmy-owls.

Noise related to military training (specifically firing of howitzers from firing boxes to the impact area) and the time of year that it occurs may also affect the establishment of occupied territories on FMR. A recent noise study (RECON 2000) on FMR analyzed noise resulting from the deployment and firing of 155 mm howitzers, both towed and self-propelled. Maximum noise levels were approximately 128 dBA at 66 feet from the muzzle of the gun and dropped below 100 dBA at 1,640 feet from the firing point. The conclusion was reached that noise levels at FMR would not be "likely to prevent the use of the habitat by cactus ferruginous pygmy-owls and, as such, should not prevent the establishment of the cactus ferruginous pygmy-owl at the Florence Military Reservation (RECON 2000:22). The conclusion was based upon the infrequency of firing over time, the limited area affected by loud noise, the natural noises of similar potential (i.e., thunder), and the historic presence of noise-sensitive raptors on FMR.

The Service believes, however, that further study is warranted before the effects of military-related noise on the future inhabitancy of FMR by pygmy-owls can be predicted. The environmental assessment (AZ ARNG 1997) prepared for changes to training facilities at FMR stated that live-fire operations will occur during 16 weekends/year and one annual training session. Each weekend session lasts for three days, and although firing does not occur continually during this period, it may last up to 10 consecutive hours. While the firing of howitzers can be described as "infrequent , it may not be infrequent enough to preclude the possibility of its occurring simultaneously with an attempted pygmy-owl dispersal into the area. In regard to the area affected by loud noise, it should be noted that, although maximum noise levels dropped below 100 dBA at a distance of 1,640 feet, noise levels remained at or above 80 dBA at distances up to 3 miles away.

The supposition that noise levels within the range of "naturally occurring phenomena, such as thunder, should not affect dispersing birds is faulty. Dangerous or unfamiliar noises are more likely to alarm wildlife than harmless and familiar noises, regardless of the intensity. Furthermore, factors other than sound intensity may play a greater role in the response of wildlife to noise disturbance. Grubb and King (1991) placed sound level behind duration, visibility, the number of disturbances per event, and the position of the stimulus, in regard to their relative importance to the disturbance of bald eagles (*Haliaeetus leucocephalus*) by noise.

Finally, the occurrence of other raptor species on FMR is not directly germane to the effects noise may have on a bird dispersing into the area. Birds with established territories are less likely to be adversely affected by noise disturbance than those in the process of choosing a new territory in which to settle. The costs of abandoning an established territory are greater than the choice not to establish a territory in a given area to a dispersing bird. Bowles *et al.* (1993) concluded that raptors respond less readily to disturbances when the costs are high. Further, birds dispersing into the area are not likely to have had prior exposure to military-related noises. Habituation is a crucial determinant of an individual's response to noise disturbances. Exposure to noises by experienced birds may produce little, if any, response (Black *et al.* 1984). The effects of military-related noises on FMR to dispersing pygmy-owls remains unclear and based upon current knowledge cannot be totally discounted.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this 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.

ASLD trust land is located in the northern portion of FMR. Normal weekday activities on State lands of FMR are non-military and are regulated by ASLD. As previously described, unrestricted public access to State lands may result in increased habitat degradation, wildfire, and disturbance to pygmy-owls should they inhabit the area. The use of recreational vehicles in Area B,

particularly off-road vehicles in riparian areas that support the denser vegetation often associated with pygmy-owl territories, is degrading the habitat. Closure of non-essential trails within the northern portion of FMR will have the added benefit of reducing access of these trails to recreational vehicles. However, recreational use of new firing boxes is reasonably certain to occur. The use of recreational vehicles within proposed firing boxes and adjacent washes has the potential to increase disturbance to habitat and further degrade these areas. The use of training areas on FMR by numerous organizations other than AZ ARNG and the continued presence of livestock, will also continue to contribute to habitat degradation.

Lands adjacent to FMR are predominantly State lands, which bound the reservation to the north, west, and southeast. A small parcel of private land occurs along the western boundary with other private areas to the south. Development within the geographic area surrounding FMR is likely to increase. It is unknown what the plans are for the surrounding State and private lands. Both State and private lands will likely continue to be subject to livestock and agricultural use. State lands may be sold or leased for commercial purposes that will likely result in impacts to potential habitat. Any future development may undergo section 7 consultation if Federal permits (e.g., section 404 Clean Water Act permits) or funding is required. Projects without a Federal nexus would be the subject of a section 10(a)(1)(B) incidental take permit if take of a listed animal was anticipated.

CONCLUSION

After reviewing the current status of cactus ferruginous pygmy-owl, 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 ongoing military activities and the addition of new firing boxes on FMR, as proposed, is not likely to jeopardize the continued existence of the cactus ferruginous pygmy-owl. Critical habitat for this species is not currently designated, thus none will be affected. We base these conclusions on the following:

1. AZ ARNG has conducted pygmy-owl surveys for the past 4 years (1997-2000) and no pygmy-owls have been detected.

2. AZ ARNG will continue to survey for pygmy-owls each spring and fall.

3. To reduce habitat disturbance within firing boxes, AZ ARNG will identify disturbed areas on trails and provide stabilization and erosion control measures.

4. AZ ARNG will also close and revegetate non-essential trails within firing boxes and restrict military vehicle access from desert washes and an adjacent 164 feet-wide buffer area on either side of the wash.

5. AZ ARNG will work in conjunction with AGFD and the Service to determine relative habitat quality, as it pertains to pygmy-owls, within existing firing boxes and areas proposed for new firing boxes, and to determine which areas would best be utilized for military use.

6. For approved firing boxes that have not yet been developed, the number of acres that will be disturbed will be compensated; an equal number of acres will be decommissioned and revegetated.

7. AZ ARNG Environmental Office personnel will work with the Service, AGFD, and Arizona State Lands Department (ASLD) to determine which areas will be decommissioned and revegetated.

8. Guidelines for revegetation will include:

   a. The use of native plant species of the same density and diversity as undisturbed areas immediately surrounding the disturbed site.

   b. Any tree mortality within a 3-year period will be replaced.

   c. Revegetated areas will be irrigated to help ensure survival.

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 further defined by the Service 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 the Service 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.

Amount or Extent of Take Anticipated

We do not anticipate the proposed action will incidentally take any pygmy-owl based on the lack of any documented use on or immediately adjacent to the action area.

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.

1. AZ ARNG should promote military personnel awareness and education about the pygmy-owl and its specific biological needs.

2. AZ ARNG should continue to survey for pygmy-owls annually.

3. AZ ARNG should continue to work in cooperation with AGFD to study pygmy-owl habitat requirements and dispersal behavior.

4. AZ ARNG should conduct or fund studies to determine the effects of military training operations on owls and/or other raptor species.

5. AZ ARNG should assist the Service in implementing the Cactus Ferruginous Pygmy-Owl Recovery Plan, once the plan is finalized.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Reinitiation Notice

This concludes formal consultation on the ongoing military activities and the proposed firing box addition on FMR, located in Pinal 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 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.

We have assigned log number 2-21-01-F-415 to this consultation. Please refer to that number in future correspondence on this consultation. If we can be of further assistance in this matter, please contact Suzie Hatten (x225) or Jim Rorabaugh (x238) of my staff.

Sincerely,

David L. Harlow
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ

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Appendix 1: CONCURRENCES

Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*)

The lesser long-nosed bat was listed as endangered in 1988. No critical habitat has been designated. This animal is a medium sized, leaf-nosed bat. It has a long muzzle, a long tongue, and is capable of hover flight. These features are adaptations that allow the bat to feed on nectar from the flowers of columnar cacti such as the saguaro (*Carnegiea giganteus*) and organ pipe cactus (*Stenocereus thurberi*), and from paniculate agaves such as Palmer's agave (*Agave palmeri*) and Parry's agave (*A. parryi*). The lesser long-nosed bat is migratory and found throughout its historic range from southern Arizona and extreme southwestern New Mexico through western Mexico and south to El Salvador. The bats arrive in southwestern and south central Arizona in April, and occupy maternity roosts until July or August when most bats move to southeastern Arizona. This migration to southeastern Arizona corresponds to the cessation of most columnar cactus blooming and fruiting in southwestern Arizona and the agave flowering period in southeastern Arizona, particularly Palmer's agave. Most lesser long-nosed bats depart Arizona by mid September, but a few stay as late as November or may overwinter (USFWS 1994, Sidner 2000).

All available information on the species through 1994 was summarized in the Lesser Long-nosed Bat Recovery Plan approved in 1997 (USFWS 1994). The Plan indicates that the species is not in danger of extinction in Arizona or Mexico, however, it is believed that the species still warrants some protection, as it is vulnerable to human disturbance at roost sites due to its gregarious behavior. There also is concern for the protection of forage plants from disturbance or destruction, particularly near roost sites.

Ongoing military training, recreational, use, and grazing may impact potential long-nosed bat foraging habitat. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 15 miles, and in Mexico at 25 miles and 38 miles (one way) (Dalton et al. 1994; V. Dalton, Tucson, pers. comm., 1997; Y. Petryszyn, University of Arizona, pers. comm., 1997). Steidl (pers. comm. 2001) found that typical one-way foraging distance for bats in southeastern Arizona is roughly 12.5 miles. A substantial portion of the lesser long-nosed bats at the Pinacate Cave in northwestern Sonora (a maternity colony) fly 25-31 miles each night to foraging areas in Organ Pipe Cactus National Monument (USFWS 1997). Horner et al. (1990) found that lesser long-nosed bats commuted 30-36 miles round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 47 miles each night. No roosts exist on FMR, but the Picacho roost is located approximately 32 miles from FMR. Based on documented distances between roosts and foraging sites, lesser long-nosed bats may forage on FMR.

Adverse effects to foraging bats may occur due to nocturnal military activities on FMR. Foraging activity may be discouraged because of loud noises generated during these activities. However, effects to foraging activity because of nocturnal operations would be minimal as FMR

represents a small percentage of foraging habitat available to long-nosed bats within its known range, and the majority of military activity occurs during the season when the bat is typically not found in Arizona (September - May).

CONCLUSION

The Service concurs with ARNG's determination that the proposed action may affect, but is not likely to adversely affect, the lesser long-nosed bat. We base this determination on the following:

1. The majority of FMR activity occurs during the season when the lesser long-nosed bat is typically not found in Arizona (September - May).

2. No roosts exist on FMR.

Literature Cited

Dalton, V.M., D.C. Dalton, and S.L. Schmidt. 1994. Roosting and foraging use of a proposed military training site by the long-nosed bat, *Leptonycteris curasoae*. Report to the Luke Air Force Natural Resources Program, Contract Nos. DACA65-94-M-0831 and DACA65-94-M-0753. 34pp.

Horner, M.A., T.H. Fleming, and M.D. Tuttle. 1990. Foraging and movement patterns of a nectar feeding bat: *Leptonycteris curasoae*. Bat Research News 31:81.

Sidner, R. 2000. The tenth year of monitoring bats and bat roostsites with emphasis upon the lesser long-nosed bat (*Leptonycteris curasoae*) on the Fort Huachuca Military Resrvation, Cochise County, Arizona July-November 1999. Report to Fort Huachuca, contract #DABT63-99-0346.

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