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

AESO/SE
2-21-02-F-207 October 24, 2002

Memorandum

To: Refuge Manager, Buenos Aires National Wildlife Refuge, Sasabe, Arizona

From: Field Supervisor

Subject: BANWR Comprehensive Conservation Plan

This biological opinion responds to your March 1, 2002, request for formal 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). We received your request on March 11, 2002. At issue are impacts resulting from the proposed Comprehensive Conservation Plan (CCP) for the Buenos Aires National Wildlife Refuge (Refuge) located in Pima County, Arizona, on Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) (pineapple cactus), and cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) (pygmy-owl).

In your memorandum, you requested our concurrence that the proposed action was not likely to adversely affect Kearny bluestar (*Amsonia kearnyana*), masked bobwhite quail (*Colinus virginianus ridgwayi*), southwestern willow flycather (*Empidonax trailli extimus*), lesser longnosed bat (*Leptonycteris curasoae yerbabuenae*), jaguar (*Panthera onca*), razorback sucker (Xyrauchen texanus), Chiricahua leopard frog (*Rana chiricahuensis*), mountain plover (*Charadrius montanus*), and yellow-billed cuckoo (*Coccyzus americanus*). Our concurrences are provided in Appendix A.

This biological opinion is based on information provided in the March 1, 2002, biological evaluation (BE) which was amended on July 1, 2002, and documents from the Refuge Fire Management Plan biological opinion (file # 2-21-02-F-068). Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, and effects of fire on semi-arid grassland habitats. A complete administrative record of this consultation is on file at the Arizona Ecological Services Office (AESO).

Consultation History

-March 11, 2002: Formal consultation initiated
-March 31, 2002: Biological Opinion for Refuge Fire Plan is signed

-June 11, 2002: Request for additional information and 60-day extension
-July 5, 2002: Amendments to the Biological Evaluation are received
-July 29, 2002: Phone conversation to request an additional 30-day extension.
-August 5, 2002: Letter officially requesting a 30-day extension sent.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Refuge is located in the southeastern quadrant of the State of Arizona, bordered on the south by Mexico. It is within the Altar Valley of south central Pima County. The north boundary of the Refuge is about 45 miles southwest of Tucson, Arizona, and the headquarters is about 60 miles from Tucson. It consists of three management units that encompass diverse plant, wildlife and wildlife recreational values. The main portion of the Refuge is the Sonoran Savanna Grasslands Management Unit that encompasses over 100,000 acres of Sonoran savanna grasslands. The Brown Canyon Unit is located on the west side of the refuge on the eastern face of the Baboquivari Mountains. This unit includes the transition from Sonoran savanna grassland to Madrean evergreen woodland at higher elevations. This unit is centered on an intermittent stream that runs in Brown Canyon and supports a diverse riparian area. The final unit is the Arivaca Unit, which is comprised of Arivaca Creek and Arivaca Cienega. This unit contains the only naturally-occurring permanent water and thus, the only aquatic communities on the Refuge.

Actions

In accordance with the National Wildlife Refuge System Improvement Act of 1997, the Refuge has developed a proposed Comprehensive Conservation Plan (CCP). This plan is to provide management direction for 15 years. The actions evaluated in this opinion include ongoing and planned management activities identified within the Refuge draft CCP as amended in the Intra-Service Section 7 BE. The actions in the CCP are organized by broad goals. Several objectives are identified for each goal, and strategies to meet these objectives are discussed. Goals and objectives are listed in this opinion. Specific strategies can be found in the draft CCP (USFWS 2000), except where strategies have been added, removed or modified since the publication of the draft CCP. These strategies are included in the description of the proposed action below.

GOAL 1: RESOURCE MANAGEMENT

Restore, protect and manage the natural abundance and diversity of wildlife and habitat utilizing strategies that focus on environmental and biological integrity.

Objective 1: Improve Refuge baseline data by conducting habitat and wildlife surveys and census on and off the Refuge. Maintain data through the use of Geographic Information System (GIS) software. Twenty-five percent of the general habitat surveys will be conducted off-Refuge.

Objective 2: Improve monitoring and surveys related to masked bobwhite quail recovery by increasing surveys by 50 percent on the Refuge and in Mexico.

Objective 3: Restore and enhance native Sonoran savanna grasslands on the Refuge. The Refuge should eventually be recognized internationally as a unique grassland ecosystem. The estimated habitat of the Refuge will be comprised of 85 percent Sonoran savanna grassland, 10 percent desert shrub and 5 percent riparian forest.

Objective 4: In cooperation with the Arizona Game and Fish Department (AGFD), increase survey efforts on a variety of species on the Refuge. The Refuge will accomplish this by conducting 20 total wildlife surveys. This will assist in expanding the Refuge's biological understandings of a diverse number of species on the Refuge and improving baseline information.

Objective 5: Develop an Arivaca Creek and Arivaca Cienega Monitoring and Restoration Plan for a 4-mile stretch of riparian habitat to evaluate changes in vegetation and wildlife populations.

Objective 6: Improve the efficiency of the Refuge Fire Program to assist in the management of masked bobwhite quail and restoration of native grasslands. The Refuge will restore approximately 14,000 acres of mesquite/grasslands annually.

Objective 7: Annually implement cattail control measures on Arivaca Cienega to improve habitat for migratory waterfowl and other aquatic species on approximately five acres.

Objective 8: Upgrade the masked bobwhite quail facilities to increase the number and quality of birds released into the wild by 50 percent.

Objective 9: Improve wildlife distributions throughout the Refuge by maintaining and improving 100 developed stock tanks and constructing a minimum of five water catchment structures by the year 2005.

Objective 10: Continue to work with AGFD to re-establish native pronghorn population(s) on the Refuge.

Objective 11: Conduct surveys to identify and document new invasive plant species on the Refuge annually.

Objective 12: Improve monitoring and surveys related to threatened, endangered, proposed, and candidate species including cactus ferruginous pygmy-owls, Pima pineapple cactus, southwestern willow flycatcher, lesser long-nosed bat, jaguar, razor-backed sucker, Kearney's bluestar, Chiricahua leopard frog, and yellow-billed cuckoo. This objective was added since the draft CCP was published, and the following are strategies to meet this objective.

1.12.A Strategy A: Conduct successive surveys for two years of all potential cactus ferruginous pygmy-owl habitat prior to prescribed burning.

1.12.B Strategy B: Conduct surveys for Pima pineapple cactus in grasslands prior to burning. Conduct post burn surveys.

1.12.C Strategy C: Conduct annual surveys for southwestern willow flycatchers.

1.12.D Strategy D: Participate in the recovery of the razor-backed suckers by providing rearing ponds.

1.12.E Strategy E: Monitor two existing populations of Kearney's bluestar.

1.12.F Strategy F: Survey yellow-billed cuckoo populations on the Refuge.

1.12.G Strategy G: Monitor for jaguar on the Refuge with remote camera sensing and guardhair collections.

1.12.H Strategy H: Monitor populations of lesser long-nosed bats on the Refuge.

1.12.I Strategy I: Write a Management Plan for the cactus ferruginous pygmy-owl in cooperation with Ecological Services. The Plan will emphasize survey protocols for the long-term protection of the species.

1.12.J Strategy J: Construct a Pima pineapple cactus predictive model which will use soil classification, geomorphology, slope, aspect, vegetative cover, and other pertinent features in GIS. This model will be incorporated into a management plan in cooperation with Ecological Services. The plan will be completed within three years.

GOAL 2: RESOURCE PROTECTION

Protect high-quality habitats through continued land acquisition from willing sellers within approved boundaries.

Objective 1: Identify and protect approximately 5000 acres of habitat essential for the long-term management of the Refuge.

Objective 2: The Refuge will seek to identify and acquire an approximately 30,000-acre ranch adjoining the Refuge to establish a research/demonstration area(s) to study alternative management options for the restoration of native Sonoran savanna grasslands and native wildlife species.

Objective 3: The Refuge will identify and purchase approximately 5000 acres or exchange lands to preserve unique cultural and archaeological resources.

GOAL 3: BINATIONAL PROTECTION

Foster binational cooperation with individuals, organizations, and agencies that strengthen endangered species management, environmental education, and outreach efforts.

Objective 1: Develop partnerships, relationships and communications with AGFD, Oklahoma State University, Turner Foundation, Nature Conservancy, Secretaria de Medio Ambiente y Recursos Naturales (SEMARNAP), Instituto del Medio Ambiente y el Desarrollo Sustentable del Estado de Sonora (IMADES), the conservation group ProNatura, Organizacion Vida Silvestre (OVIS), and private landowners in the U.S. and Mexico to increase environmental awareness/education and implementation of wildlife and habitat management goals on both sides of the border.

Objective 2: Improve monitoring and surveys related to masked bobwhite quail recovery by increasing surveys 50 percent on the Refuge and in Mexico. *See Goal 1, Objective 2

GOAL 4: PUBLIC USE AND INTERPRETATION

Provide safe, accessible, high-quality, wildlife-dependent recreational opportunities.

Objective 1: Increase public use visitation to approximately 35,000 visitors per annum in the Arivaca Management Unit by constructing a Visitor Center at the entrance of Cienega Trail.

Objective 2: Improve and upgrade approximately 3 miles along the Arivaca Creek Trail to provide for wildlife observations and photography opportunities.

Objective 3: Improve approximately 2 miles of the Aguirre Lake Tour Loop and associated facilities to allow better public access for approximately 10,000 visitors to participate in wildlife observation, interpretation, and photography activities.

Objective 4: Provide 100 evenly distributed campsites throughout the Refuge to offer recreational users a quality camping experience in conjunction with other wildlife/wildlands opportunities.

Objective 5: Improve trail head parking lots to enhance visitor experience.

Objective 6: Redesign the existing 12-mile Antelope Drive Tour Loop and surface with chip seal to provide a more enjoyable opportunity for wildlife viewing by approximately 15,000 visitors annually. The road becomes impassable after heavy rains and is easily damaged by vehicles.

Objective 7: Provide for enhanced wildlife photography opportunities through the construction of three permanent photo blinds.

Objective 8: Provide hunting opportunities for approximately 2000 hunters of resident wildlife and migratory birds on the Refuge.

Objective 9: Horseback riding will be permitted on the Refuge except on designated walking trails and improved roads.

Objective 10: Mountain biking will be permitted on all improved and unimproved roads.

GOAL 5: ENVIRONMENTAL EDUCATION AND INTERPRETATION

Provide high quality educational opportunities that promote awareness, appreciation, and understanding of the Refuge's role in managing wildlife and habitat.

Objective 1: Educate the public through slide programs, leaflets and workshops about the purpose of the Refuge and its role in preserving natural environments and wildlife.

Objective 2: Develop a 1-acre cottonwood/willow riparian demonstration area on the Refuge.

Objective 3: Implement Brown Canyon Visitor Center improvements to serve 2000 existing visitors and 2000 new visitors and meet watchable wildlife, photography, and public recreation interpretation objective levels. Strategy H in the draft CCP has been removed from consideration as part of the plan.

Objective 4: Provide 12 volunteer/research facilities on the Refuge to attract qualified and competent volunteers/researchers important to carrying out various Refuge programs.

Objective 5: Provide a shuttle service for approximately 16 persons into Brown Canyon to preserve the uniqueness of the area and maintain the wildland/wildlife experience for visitors.

Objective 6: This objective and the related construction needed to extend electrical and telephone utilities to the Brown Canyon Environmental Education Center has been removed from consideration as part of the plan.

Objective 7: Improve the Brown Canyon road for public and administrative access.

Objective 8: Improve the Refuge Visitor Center facilities and roads to more efficiently meet the needs of 35,000 existing visitors and 20,000 new visitors annually.

Objective 9: Increase Environmental Education Outreach to approximately 2000 students annually as a means of utilizing the "outdoor classroom" experience to demonstrate Refuge

activities focusing on endangered species recovery, neotropical migrants, and riparian and grassland ecosystem issues. *See Goal 6, Objective 4

GOAL 6: DYNAMIC PARTNERING

Reach out to communities, organizations, agencies and individuals, creating partnerships that provide resources and support necessary to accomplish refuge purposes and goals.

Objective 1: Enhance outreach, public use, and recreation activities through continued coordination with 10 local conservation groups and organizations.

Objective 2: Solicit input from involved agencies, institutions, and groups to help coordinate and evaluate wildlife and habitat management activities on or near the Refuge, thereby promoting decisions benefitting fish and wildlife resources while avoiding or limiting duplication of effort.

Objective 3: Restore and enhance approximately 80,000 acres of native Sonoran savanna grasslands on the Refuge. The Refuge should eventually be recognized internationally as a unique grassland ecosystem.

Objective 4: Increase Environmental Education Outreach to approximately 2,000 students annually as a means of utilizing the "outdoor classroom experience" for demonstrating Refuge activities focusing on endangered species recovery, neotropical migrants, and riparian and grassland ecosystem issues. *See Goal 5, Objective 9

GOAL 7: ARCHAEOLOGICAL, CULTURAL AND HISTORICAL RESOURCES

Identify, protect, maintain, and plan for Service managed cultural resources on the Refuge for the benefit of present and future generations.

Objective 1: Develop appropriate management practices to protect cultural resources within the scope of Part 614 of the Service Manual and all applicable Federal laws and regulations. By 2005 identify and map known cultural sites. By 2010 provide appropriate protection and law enforcement measures to prevent disturbance to sites where human activity is possible.

GOAL 8: REFUGE ADMINISTRATION AND STAFFING

Secure adequate staffing and funding to accomplish identified wildlife, habitat, and public use goals.

Objective 1: Hire 15 additional staff to meet habitat and wildlife resource and public use goals both on and off the Refuge.

Objective 2: Construct a new administrative site providing adequate facilities to meet Service Standards.

Objective 3: Improve public safety for all visitors and reduce theft from government facilities and of private property on the Refuge.

Objective 4: Increase Administrative Support to more efficiently handle basic personnel, budgetary, and daily operational demands of 36 permanent employees, who are necessary for the operation of the Refuge.

Objective 5: Increase maintenance support and capabilities to meet the needs of the daily maintenance operations of the Refuge's 40+ vehicle fleet, 45 buildings and 200 miles of roads.

Objective 6: Improve Refuge security for Refuge buildings and 15 government employees' quarters to protect private and government property.

Objective 7: Improve the Refuge's Safety Program through educational pamphlets, films and policy updates.

Objective 8: Purchase and upgrade office furnishings at all Visitor Centers and administrative sites.

Objective 9: Improve boundary delineations on approximately 100 miles of Refuge boundary.

CONSERVATION MEASURES

Conservation Measures for Cactus Ferruginous Pygmy-owls

- Surveys for cactus ferruginous pygmy-owls will be conducted in all high-ranking washes (using Aaron Flesch's habitat ranking system) and around high-ranking tanks for two consecutive years prior to each proposed burn beginning in Winter/Spring 2002. Surveys will be done in any appropriate habitat which may exist around construction projects or any type of project involving removal of vegetation by mechanical or chemical methods.

- If an owl or owls occur within a proposed burn area at the time of burn, the burn will be cancelled for that year. If an owl occurs in the area around a construction project, the area will be evaluated as to whether the construction project can be moved to a different site. If that is not possible, then construction activities will be suspended during the period when the owl is nesting and rearing young.

- Activities which may cause disturbance to owls known to be nesting will be suspended until the owl's nestlings have fledged.

- Portions of washes that have high-ranking habitat that have had owls occurring in them will be protected from prescribed fire each year by black-lining the fine fuels on the edge of the wash to avoid burning these washes.

- During a prescribed burn, all ignition patterns will be adjusted so that head fires will be diverted away from washes as best as possible to avoid burning trees bordering washes.

- All saguaro cacti (*Cereus giganteus*) will be protected from harmful activities in order to provide potential cavity sites for the owl. Saguaros will be protected from prescribed fire by black-lining the perimeter of a 1-acre area around each cactus. The vegetation within the acre will be evaluated to determine if the fine fuels should be reduced as well (by moving or cool burn) to reduce the chance of a spark jumping the line and burning the saguaro. Saguaros will be protected, as much as possible from all known harmful activities which could affect their growth or survival.

- A pygmy-owl management plan will be devised which will implement monitoring actions which will take place to assure the survival of the species. Ecological Services personnel will be key advisors in devising this plan. The plan will be completed within three years.

Conservation Measures for Pima Pineapple Cactus

- Surveys for Pima pineapple cactus will be conducted in each fire management unit scheduled for burning prior to and after prescribed burns each year. The goal is to survey each fire management unit completely both prior to and after a prescribed fire. The Refuge will continue to explore ways to get more help for surveys.

- Surveys for pineapple cactus will be done prior to any construction activities or any other type of potentially harmful activity. If it is feasible to move the construction site to another location where cacti do not occur, the site will be moved.

- Data collected as part of each survey will include: a map of the area surveyed, hours surveyed, number of people surveying, number of Pima pineapple cactus found, number of cactus located and UTMs for each individual located. Pima pineapple cactus data sheets will be completed for each individual.

- All known Pima pineapple cactus will be marked and protected from fire by burning a black-line about 5 m out from the plant, leaving the vegetation within the 5 m radius untouched. A fire-proof, cone-like structure is being investigated as another way of protecting each plant.

- If wildlife habitat management projects are ever planned which call for the use of pesticides or herbicides, the project site will be surveyed for pineapple cactus. All pineapple cactus

located will be protected from the effects of pesticide/herbicide by use of the aforementioned fireproof cones or other protective device.

- A pineapple cactus predictive model will be developed which will use soil classification, geomorphology, slope aspect, vegetative cover and other pertinent features in GIS. This model will be incorporated into a plan, devised with the assistance of Ecological Services personnel, which will outline cactus management and monitoring actions. This plan will be formulated within the next 3 years. Actions recommended in the plan will be implemented and will take priority over any monition actions done in the interim.

- The Refuge will meet with Arizona Ecological Services biologists after 1 year to evaluate the predictive model and post-fire mortality. If changes are needed in burning protocol, they will be addressed at that time.

Please refer to the draft CCP for specific strategies proposed to achieve the goals and objects listed above. The types of actions proposed in the Refuge CCP fall into several categories. These include administrative, education, recreation, research and monitoring, habitat enhancement and restoration, land acquisition, recovery, and construction.

STATUS OF THE SPECIES

Pima pineapple cactus

Life History

The final rule listing Pima pineapple cactus as endangered was published September 23, 1993 (58 FR 49875). The rule became effective on October 25, 1993; critical habitat was not designated at that time. Factors that contributed to the listing include habitat loss and degradation, habitat modification and fragmentation, limited geographic distribution and plant species rareness, illegal collection and difficulties in protecting areas large enough to maintain functioning populations. The biological information below is summarized from the proposed and final rules, and other sources.

Pima pineapple cactus is a low-growing hemispherical cactus with adults varying in stem diameter from 5.0 cm (2.0 inches) to 21.0 cm (8.3 inches) and height from 4.5 cm (1.8 inches) to 45.7 cm (18.0 inches). Individuals are considered adults when they reproduce sexually. Plants can be either single or multi-stemmed with yellow flowers blooming with the summer rains. Clusters of Pima pineapple cactus stems are formed primarily from vegetative clones produced at the plant base (Benson 1982, Roller 1996). The diagnostic field character of this taxon is the presence of one stout, straw-colored, hooked central spine. Radial spines extend laterally around the central spine and average 10 to 15 spines on large cacti and six on small cacti (Benson 1982).

Pima pineapple cactus occurs south of Tucson, in Pima and Santa Cruz counties, Arizona and adjacent northern Sonora, Mexico. It is distributed at very low densities throughout both the Altar and Santa Cruz valleys, and in low lying areas connecting the two valleys.

Groups of flowers begin to bloom for single-day periods following five to seven days after the first monsoon rains. Flowering is triggered by as little precipitation as 3 mm (0.12 inches). Generally flowers begin opening midmorning and close at dusk (Roller 1996). Adult plants bloom one to three days each year; flowering is usually over by the end of August. Cross-pollination produces significantly more viable seeds than self-pollination. Fruits are mature within two weeks following successful pollination. Germination has been observed in the field during the summer monsoon rainy season (Roller 1996). Anecdotal observations indicate the species' flowers are visited by a variety of native bees and European honey bees, which have been observed to leave the flowers with their forehead and hind legs covered in Pima pineapple cactus pollen.

Habitat fragmentation and isolation may be an important factor limiting future seed set of this cactus. Recent data show that the species cannot successfully self pollinate in situ and is reliant on invertebrate pollinators. One hypothesis is that the spatial distribution pattern of individual Pima pineapple cacti within a given area may regulate pollinator visitations, thus resulting in more successful cross-pollination and subsequent seed set over the population (Roller 1996). If the pollinators are small insects, with limited ability to fly over large distances, habitat fragmentation may contribute to a decrease in pollinator effectiveness with a subsequent decrease in seed set and recruitment.

Population Stability

Extrapolations from recent (1992-1997) surveys of known Pima pineapple cactus locations suggest that the cactus may be more numerous than previously thought. Projections based only on known individuals may underestimate the total number of individuals. This in no way indicates that the cactus is not rare or endangered. Pima pineapple cactus is widely dispersed in very small clusters across land areas well suited for residential, commercial or mining development. As well, field observations suggest a great deal of land area within the range boundaries would not support Pima pineapple cactus today due to historic human impacts. Thus, populations are already considerably isolated from each other in many portions of the range, and population size and apparent recruitment varies significantly across the range. On a more local scale, population variability may relate to habitat development, modification, and/or other environmental factors such as slope, vegetation, pollinators, dispersal mechanisms, etc.

The transition zone between the two regions of vegetation described by Brown (1982) as semidesert grassland and Sonoran desert-scrub contains denser populations, better recruitment, and individuals exhibiting greater plant vigor. Vegetation within this transition zone is dominated by mid-sized mesquite trees, half shrubs (snakeweed (*Gutierrezia lucida*), burroweed (*Aplopappus tenuisectus*), and desert zinnia (*Zinnia* spp.)) with patches of native grass and

scattered succulents. Because populations are healthier in this transition zone, conservation within these areas is very important (Roller and Halvorson 1997). However, this important habitat type is not uniformly distributed throughout the plant's range. Populations of Pima pineapple cacti are patchy, widely dispersed and highly variable in density. The higher population densities have only been documented at three sites. Compared to other surveys, two of these sites are very small in scale and range from 6.3-7.5 plants per ha (1-3 plants per acre). Other densities across the majority of the plant's range vary between one plant per 1.9 ha (4.6 acres) and one plant per 8.5 ha (21 acres) (Mills 1991, Ecosphere 1992, Roller 1996).

Land areas surrounding developed parts of Green Valley and Sahuarita, Arizona (including adjacent areas of the San Xavier District of the Tohono O'odham Nation) may be important for the conservation of this species within its range. Analysis of surveys conducted from 1992 to 1995 with a multivariate statistical analysis established a pattern of greater population densities, higher ranks of cactus vigor and reproduction occurring within the transition vegetation type found in this area of the northern Santa Cruz Valley (Roller and Halvorson 1997). This area could be defined as an ecotone boundary between semidesert grassland and Sonoran desert scrub.

Seedling and sub-adult size classes are uncommon in documented populations across the range. However, this may be a function of the difficulty of finding such small, well-camouflaged plants in a large-scale survey, or because the establishment phase of the seedling may be limited in some unknown way. Research on Pima pineapple cactus reproduction has suggested that the establishment phase of Pima pineapple cactus life history may limit recruitment within populations (Roller 1996). Evidence presented to support this conclusion was the abundance of flowers, fruits and viable seed, and the rarity of seedling presence at different sites spread through the plant's range (Roller 1996). Other research has confirmed that the establishment phase of other Sonoran cacti species may be critical for survival to reproductive maturity (Steenbergh and Lowe 1977).

Status and Distribution

Generally, the Pima pineapple cactus grows on gentle slopes of less than 10 percent and along the tops (upland areas) of alluvial bajadas nearest to the basins coming down from steep rocky slopes. The plant is found at elevations between 720 m (2,362 ft) and 1,440 m (4,593 ft) (Phillips et al. 1981, Benson 1982, Ecosphere 1992), in vegetation characterized as either or as combination of both the Arizona upland of the Sonoran desert scrub and semidesert grasslands (Brown 1982).

The acquisition of baseline information began with surveys documenting the presence of Pima pineapple cactus as early as 1935. More intensive surveys were initiated in 1991 and other research established in 1993 further investigated the reproductive biology, distribution, fire effects and mortality associated with various threats. Therefore, the best available baseline information is relatively recent and may not represent actual changes in distribution since the decline in the status of the species began.

Widely scattered surveys have been conducted across sites that varied considerably in cacti density. Densities ranged between 0.1-7.5 plants per ha (0.05-3 plants per acre). Pima pineapple cactus occurs in 50 townships within its U.S. range. However, a considerable amount of land area within the range boundaries does not provide habitat for the species due to elevation, topography, hydrology, plant community type, and human degradation. To date, an estimated 22,959 ha (56,730 acres) (10 to 20 percent of the U.S. range) has been surveyed. Not all of this area has been intensively surveyed; some has only been partially surveyed using small land blocks to estimate densities rather than 100 percent ground surveys. A conservative estimate of total cacti located to date would be 3,800 individuals. The majority of those were located after 1991.

It is important to clarify that the above number represents the total number of locations ever found and not the current population size. It would be impossible to estimate densities over the remaining unsurveyed area because of the clumped and widely dispersed pattern of distribution of this species. Of the 3,800 individuals known at this time, 2,203 (58 percent) of them have been removed throughout the range. This quantity includes observed and authorized mortalities and individuals transplanted since the species was listed in 1993 to present. A small portion of these mortalities were caused by natural factors (i.e., drought). Moreover, this figure does not take into account those cacti that are removed from private land or other projects that have no Federal nexus.

Transplanted individuals are not considered as functioning within the context of a self-sustaining population. Efforts to transplant individual cacti to other locations have only had limited success and the mortality rate has been high, especially after the first year. Furthermore, once individuals are transplanted from a site it is considered to be extirpated as those individuals functioning in that habitat are irretrievably lost. The Service hopes that continued experimentation will improve the success rate of transplantation. In the meantime, until information suggests that reintroduction efforts are successful, transplanted individuals will not be counted as operative units of the entire population.

The area of habitat authorized to be modified or destroyed between 1987 and 2000 (i.e., habitat developed or significantly modified beyond the point where restoration would be a likely alternative) was approximately 9,886 ha (24,429 acres) which represents 43 percent of the total area surveyed to date. In 1998, more than 445.5 ha (1,100 acres) of Pima pineapple cactus were lost including 143 ha (353 acres) from the Las Campanas Housing Development project, and 304.6 ha (752 acres) from the ASARCO, Inc. Mission complex project. In 2000, 237.3 ha (586 acres) of habitat were lost with the expansion of a state prison in Tucson. In 2001, 71.7 ha (177 acres) of habitat were lost through development, but 375.8 ha (888 acres) of occupied and suitable habitat were conserved through conservation easements. The Service is aware of housing developments along Valencia Road, Pima County, Arizona, in the vicinity of T15S, R12E, Section 15 and surrounding areas, that support Pima pineapple cactus. These developments affect several hundred acres of habitat and have not been evaluated through the

section 7 process. The number of acres lost through private actions, not subject to Federal jurisdiction, is not known but given the rate of urban development in Pima County, is expected to be significant.

Most of the development documented in habitat has occurred south of Tucson down through the Santa Cruz Valley to the town of Amado. This area is critical for the future recovery of the species. The expansion of urban centers, population and mining activities will continue to eliminate habitat and individuals, and result in habitat fragmentation.

The protection of habitat and individuals is complicated by the varying land ownership within the range of this species. An estimated 10 percent of the potential habitat for Pima pineapple cactus is held in Federal ownership. The remaining 90 percent is on Tribal, State, and private lands. Most of the federally owned land is either at the edge of the species' range or in scattered parcels. The largest contiguous piece of federally owned land is the Buenos Aires National Wildlife Refuge, located at the southwestern edge of the species' range at higher elevations and lower plant densities.

Based on surveys and habitat analysis, land areas south of Tucson through the Santa Cruz Valley to the town of Amado and surrounding developed parts of Green Valley and Sahuarita, and parts of the San Xavier District of the Tohono O'odham Nation, appear to support abundant populations, some recruitment, and units of extensive habitat still remain. However, the primary threat to the status of this species throughout its range is the accelerated rate (i.e., since 1993) at which this prime habitat is being developed, fragmented or modified.

Under section 9 of the Act, the taking of listed animals is specifically prohibited, regardless of landownership status. For listed plants, these prohibitions and the protection they afford do not apply. Listed plant species are protected only from deliberate removal from Federal lands. There is no protection against removal from, or destruction of, plants on any non-Federal lands under the Act by a land owner. The Arizona Native Plant Law may delay vegetation clearing on private property for the salvage of specific plants species within a 30-day period. Although the Arizona State Native Plant Law does prohibit the illegal taking of this species on state and private lands without a permit for educational or research purposes, it does not provide for protection of plants in situ through restrictions on development activities.

Section 7 protection extends to listed plants regardless of landownership if there is a Federal nexus. However, without Federal agency involvement, section 7 does not apply to projects on non-Federal lands. Much of the development likely on State or private lands has a limited exposure to Federal regulatory requirements. Additional Pima pineapple cacti and associated habitat on these lands are almost certain to be lost as development in southern Arizona continues through the Santa Cruz Valley. Efforts to transplant individual cacti to other locations have had limited success, and as development increases, suitable locations will become scarce as habitat is converted.

Based on current knowledge, the following threats documented with this reduction in habitat

alter the landscape in a manner that would be nearly irreversible in terms of supporting Pima pineapple cactus populations: urbanization, farm and crop development, and exotic species invasion. Prescribed fire can have a negative affect if not planned properly.

Other specific threats which have been previously documented (USFWS 1993), such as overgrazing and mining, have not yet been analyzed to determine the extent of effects to this species. However, partial information does exist and can be applied. Mining has resulted in the loss of hundreds, if not thousands, of acres of potential habitat throughout the range of the species. Much of the mining activity has been occurring in the Green Valley area, which is the center of the species' distribution and the area known to support the highest densities of individuals. Overgrazing by livestock, illegal plant collection, and fire-related interactions involving exotic Lehmann lovegrass (*Eragrostis lehmanniana*) may also negatively affect Pima pineapple cactus populations (USFWS 1993).

Vegetation associated with higher Pima pineapple cactus densities, reproduction, and greater levels of cactus vigor is described as a mid-sized mesquite shrub land with an assortment of other succulent species and native bunch grasses. Many of the species dominant in this vegetation type are associated with grazing (i.e., "increasers" under some grazing practices). Less intensively grazed pastures did support greater native grass coverage with more species present. However, even with an increased bunch grass abundance, the fuel structure of the community was not continuous and allowed for substantial open patches along the drip line of shrub species where the cactus often occurs (Roller and Halvorson 1997). Also, specific levels of soil movement are required for seed germination because the seed will not germinate on the surface; it generally germinates at a depth of 0.5-1.5 cm (0.2 - 0.6 inches) (Roller 1996). Few locations throughout the plant's range have documented the presence of seedlings or sub-adults. However, all but one of the known locations had been grazed within three years of the observation. Whether light to moderate grazing practices provide the appropriate level of soil movement to cause seed germination has not been determined. Over-land sheet flow across these areas may also move soil and deposit it over sediments. The study established on the Coronado National Forest should provide some insight on seed germination relative to specific grazing intensities.

Reduced herbaceous biomass within the immediate proximity of individuals may reduce heat intensity with fire. Reduced herbaceous cover and continuity decrease fire frequencies in semidesert grasslands, and over the long-term increase cactus survival following fire (McPherson 1995, Thomas and Goodson 1992, Wright and Bailey 1982).

The invasion of Lehmann lovegrass combined with fire is a threat to Pima pineapple cactus populations. Continuous distributions of fuels and greater biomass near the apex of individual plants are believed to increase mortality following fire (Roller and Halvorson 1997). Fire increases Lehmann lovegrass distribution; correspondingly, fire intensity and fire frequency increases with Lehmann lovegrass invasion (McPherson 1995), a positive-feedback cycle. Even with complete data on historical change related to Pima pineapple cactus distribution and abundance, the Service cannot reliably predict population status due to compounding factors such

as climate change, urbanization, legal, and political complexities (McPherson 1995). We do not know if the majority of populations of Pima pineapple cactus can be sustainable under current reduced and fragmented conditions. Thus, the need for information on what limits the plant's distribution under current habitat conditions is significant.

Based on monitoring results, the range-wide status of the Pima pineapple cactus appears to have been recently affected by threats that completely alter or considerably modify more than a third of the species' surveyed habitat, and have caused the elimination of nearly 60 percent of documented locations. These values are supplied to serve as an extrapolation of the situation which might be taking place across the rest of the entire population. Current information regarding the status of this species must be supplemented by more precise and thorough spatial analysis through the use of geographical information systems, databases, and on-the-ground surveys.

Dispersed, patchy clusters of individuals are becoming increasingly isolated as urban development, mining, and other commercial activities continue to detrimentally impact the habitat. The remaining habitat also is subject to degradation or modification from current land management practices, increased recreational use when adjacent to urban expansion (i.e., off-road vehicle use and illegal collection), and the continuing aggressive spread of nonnative grasses into its habitat. Habitat fragmentation and degradation will likely continue into the foreseeable future based on historic data and growth projections produced by the Pima County Association of Governments (1995). There is very little Federal oversight on conservation measures that would protect or recover the majority of the potential habitat. Even some areas legally protected under the Act have been modified and may not be able to support viable populations of the Pima pineapple cactus over the long-term.

Cactus ferruginous pygmy-owl

Life History

We listed the Arizona population of the pygmy-owl as a distinct population segment (DPS) on March 10, 1997 (62 FR 10730). 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 about 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 (64 FR 37419). 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 us for further consideration. We are working on the proposal for redesignation and it should be published by 2003.

Pygmy-owls are small birds, averaging 6.75 inches in length, colored 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 desertscrub, and semidesert grassland 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 documented in association 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.). These large trees provide cavities suitable for pygmy-owl 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 the Sonoran desert, particularly Sonoran desertscrub (Brown 1994). This community in southern Arizona consists of paloverde (*Cercidium* spp.), ironwood (*Olynoya tesota*), mesquite, acacia (*Acacia* spp.), bursage (*Ambrosia* spp.), and columnar cacti (Phillips et al. 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985, Johnsgard 1988). Over the past several years, pygmy-owls have also been found in riparian and xeroriparian habitats and semidesert grasslands as classified by Brown (1994). Desertscrub communities are characterized by the presence of saguaros or large trees, and a diversity of plant species and vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. Semidesert grasslands have experienced the invasion of velvet mesquites (*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), 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, small mammals (Bendire 1888, Sutton 1951, Sprunt 1955, Earhart and Johnson 1970, Oberholser 1974), and toads (Proudfoot 1996). 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 courtship and nesting activities in late winter to early spring. In Arizona, differences in nesting chronology among nest sites may vary by as much as two months (Abbate et al. 1996, Scott Richardson, 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 about 165 feet of the adult birds until dispersal. Dispersal distances (straight line) of 20 juveniles monitored from their natal sites to nest sites the following year averaged five miles (which ranged from 0.75 to 19 mi [G. Proudfoot unpubl. data]). Telemetry studies of dispersing juveniles in Arizona during 1999 and 2000, ranged from 1.4 to 12.9 mi (straight line distance) (n=6, mean 6.2 mi) in 1999, and 1.6 to 11.7 mi (n=6, mean 5.8 mi) in 2000 (S. Richardson, 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). Typically, juveniles 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 the same territory as was occupied in previous years well into the spring, exhibiting territorial behavior (calling) for about two months until ultimately switching territories, pairing 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 while pygmy-owls used between three and 57 acres during the nesting period, they defend areas up to 279 acres in the winter. Based on this information, a conservative estimate of 280 acres for a home range is considered necessary for pygmy-owls.

Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 to 2,000 ft. Initial results from on-going studies in Texas indicate that the home range of pygmy-owls may also expand substantially during dry years (G. Proudfoot unpubl. data).

Population Stability

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. 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.

We are funding habitat studies and surveys in Sonora, Mexico, to determine the distribution and relative abundance of the pygmy-owl there. 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 Distinct Population Segment (DPS) of the pygmy-owl extends from the International Border with Mexico northward to central Arizona. The northernmost historical record for the pygmy-owl is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the pygmy-owl to be “quite common” in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, the pygmy-owl, prior to the mid-1900s, was “not uncommon”, “of common occurrence”, and a “fairly numerous” resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (S. Richardson, AGFD unpubl. data, Hunter 1988). Records from the eastern portion of the pygmy-owl's range include a 1876 record from Camp Goodwin (near present day Geronimo) on the Gila River, and a 1978 record from Gillard Hot Springs, also located on the Gila River. Pygmy-owls have been found as far west as the Cabeza Prieta Tanks, Yuma County, Arizona, in 1955 (Monson 1998).

Hunter (1988) found fewer than 20 verified records of pygmy-owls in Arizona for the period from 1971 to 1988. Formal surveys for the pygmy-owl on OPCNM began in 1990, with one bird located that year. Beginning in 1992, formal survey efforts conducted in cooperation with the AGFD, located three single pygmy-owls on OPCNM [USFWS unpubl. data; 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 a 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 five adult pygmy-owls and one juvenile, confirming nesting for the first time 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 two offspring which successfully fledged. Three additional pygmy-owls and three other unconfirmed reports were also recorded at OPCNM in 1996.

Status and Distribution

While many 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), the Altar Valley, and on the Coronado National Forest. The following is a brief summary of recent pygmy-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 (young that left their nest cavity) four young, two of which were banded. Two adult males were also located at OPCNM, with one reported from a previously unoccupied area (USFWS 1999b).

In 1998, survey efforts in Arizona increased substantially and 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 (AGFD unpubl. data; USFWS unpubl. data, T. Tibbitts, OPCNM unpubl. data, 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 us. 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). It is unclear what the survival rate for pygmy-owls is; however, as with other owls and raptors, a high mortality (50 percent or greater) 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 (AGFD unpubl. data; T. Tibbitts, OPCNM

[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.

unpubl. data; USFWS unpubl. data). A total of 34 adult pygmy-owls were confirmed. Nesting was documented at seven sites and 23 fledglings were confirmed. A total of nine juvenile pygmy-owls 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 2001 season resulted in a total of 47 adult pygmy-owls confirmed at 29 sites[2] in Arizona (AGFD unpubl. data; T. Tibbitts, OPCNM unpubl. data; USFWS unpubl. data). There were also several additional, unconfirmed sites that are not included in these totals. Nesting was documented at 17 sites and 24 young were confirmed to have successfully fledged. In addition, there were two nests with young that potentially could have fledged young; however, this was not confirmed. Similar to the previous three years, there was a greater than 50 percent fledgling mortality documented in 2001 (AGFD unpubl. data). In 2001, the following regions of the state were known to have pygmy-owls:

- Tucson Basin (northwestern Tucson and southern Pinal County) - A total of eight adults (three pairs and two single resident males) were confirmed at five sites, all of which were in Pima County. One unpaired male pygmy-owl was documented in southern Pinal County. Three nests in northwestern Tucson were confirmed, all with young.

- Altar Valley - A total of 18 adult pygmy-owls were documented at 12 sites[3]. As a result of increased access to portions of the valley, the number of known owls increased to seven pairs and four resident single owls. A total of seven nests were confirmed.

- OPCNM and CPNWR - Twelve adults, consisting of two pairs and four single pygmy-owls were confirmed at eight sites. Three nests were active. Two new sites were documented on the CPNWR and one north of OPCNM near Ajo, Arizona.

- Other areas - A total of nine adults, consisting of four pairs and one single pygmy-owl at five sites documented in other areas of southern Arizona. Nesting was confirmed at four 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 recent surveys have taken place. A majority of surveys since 1993 took place at OPCNM and the Tucson Basin, and these areas are where most owl locations have been recorded. From 2000 to 2002, larger, previously unsurveyed areas have been inventoried for pygmy-owl, resulting in a wider distribution than previously known. Knowledge is improving regarding pygmy-owl distribution

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

[3] There was one additional female found in Altar Valley dead in a saguaro cavity, suspected to have been killed by a screech owl (AGFD unpubl. data).

and habitat needs as new information is collected. Prior to 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. 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 documented nest sites in Altar Valley than in the Tucson Basin (AGFD unpubl. data).

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.

Areas of the Altar Valley, which are now part of the Refuge, are considered to have once been representative of the Sonoran Savanna Grassland, a biotic community which now only exists as small, relict stands in Mexico. The Sonoran Savanna Grassland was a subtropical fire-climax grassland which occurred in valleys with level plains and gentle rolling hills on deep, fine textured soils. The principle grass species were summer-active root perennials such as Rothrock grama (*Bouteloua rothrokii*) and various species of three-awns (*Artistida* sp.). Other dominant plant species which were present were also of subtropical origins. Herbaceous shrubs and forbs were important components of this grassland community. Species characteristic of warm temperate origins such as curly mesquite (*Hilaria belangeri*) and side-oats grama (*B. curtipendula*) were likely restricted to sites along drainages and north-facing slopes. Most of the scrub species characteristic of semidesert grasslands such as burroweed and snakeweed were not typical components of the Sonoran Savanna Grassland Community, but probably occurred in the general vicinity. Trees and large shrubs were present within this community, but varied in density. Mesquites were present at one or two per acre in the southern portion of the valley and increased in frequency further north and were typically mature trees, 4 to 12 inches in diameter (Sayre 1999, Sayre 2000). Larger cacti, such as saguaros, were present, but not prevalent (Brown 1982).

The land managed by the Refuge is now largely considered semi-desert grassland or desert scrub. Mesquite and other woody species have invaded the upland habitats throughout the valley. This is due a combination of long-term climate changes the introduction of cattle and horses, and the resulting soil erosion brought on by historic poor grazing management. Impacts from human agricultural uses combined with periods of severe drought and the lowering of the water table from the deepening of the arroyos in the valley have resulted in a habitat conversion favoring trees, woody shrubs and exotic grasses introduced in an attempt to halt the watershed degradation.

During the period from 1986 to 2000 approximately 43,560 acres burned in 116 reported wildfires. The acres burned ranged from 1 to 14,451 acres annually, with an average of 2,904 acres (USWFS 2001). The Refuge has used prescribed fire to manage the grassland habitat on the Refuge since 1988. In 1988, areas were burned in response to professional judgement for quail releases. During 1990-92, winter prescribed burns were used to open up bottom land vegetation with little success in improving the grassland habitat (USWFS 2001). In 1992, an evaluation of fire effects was made and spring burns were determined to show the best results for control of weedy species. In the period from 1988 to 2001, prescribed fire was used to burn 102,389.6 acres in 50 units (USWFS 2001).

In the period of 1999-2001, State Route (SR) 286 at approximately mile post 23 was realigned to straighten a section of road and replace a bridge. As part of this action the existing right-of-way was exchanged for the new alignment on a portion of the Refuge. The old road was removed and the road bed in the old alignment was ripped and seeded to restore the habitat. In addition, improvements to the Antelope Loop road (4.6.B) were started with the pull-off, all weather wash crossings, and the widening of the northern section of the road. Improvements to the Antelope Tour Loop are currently being completed. Based upon the information in the Biological Evaluation, the 12-mile tour road will be widened by 6 feet on either side of the existing road. This widening resulted in the loss of a minimum of 8.7 acres of grassland habitat for masked bobwhite quail and Pima pineapple cactus.

Pima pineapple cactus

A. Status of the species within the action area

The Refuge is the largest contiguous piece of federally owned land which is known to contain Pima pineapple cactus. In the 1991 request to initiate consultation on the Refuge fire program, the Refuge documented less than 20 individuals in two areas of the Refuge. The Refuge in the 1992 Prescribed Burning Program BA, stated that burn units would be searched for these cacti, and weed trimmers would be used to create firelines around each cactus.

In the 1994 BO for the Refuge Prescribed Grassland Burning, approximately 64 Pima pineapple cacti were known to occur on the Refuge (USFWS 1994a). It was noted that surveys of the three burn units proposed for 1994 were not complete and only three cacti were so far known in these units. It was expected that undiscovered cacti were present in these burn units and could possibly be killed from direct damage by fire. Conservation recommendations for the cactus were 1) protect known individuals, 2) survey areas to be burned and concentrate surveys in higher quality habitat, 3) survey areas post burn to determine detectability and refine the identification of potential habitat, 4) track individual cacti, 5) develop a 5-year fire plan with monitoring to determine the effect of the fire program on the spread of Lehmann lovegrass versus native grass, and 6) conduct intensive surveys in areas of ground disturbance.

In 1995, the 5-year fire plan recommended in 1994 was presented to AESO. It referred to 68 known Pima pineapple cacti on the Refuge. A major portion of this plan involved monitoring to

determine the effectiveness of the fire management program on restoring habitat for masked bobwhite quail. In addition, the monitoring program would determine the effect the fire program had on the spread of Lehmann lovegrass. This is of particular importance as the ability of Pima pineapple cactus to withstand fire in native grass may be different from its ability to withstand fire in monotypic stands of Lehmann lovegrass. Lehmann lovegrass stands support higher fuel loads, more intense heat and can burn more often than native grasslands, with the potential result of higher mortality of Pima pineapple cactus located in Lehmann lovegrass stands. To date, no results have been received from the monitoring that was in the conservation recommendation in 1994 BO and included as part of the fire management plan consulted on in 1995. The current Fire Management Plan, approved in September 2001, includes the same plan to monitor and evaluate the fire management program's ability to meet objectives and determine effects it has on the native versus exotic vegetation.

In the 2002 Intra-Service Section 7 Consultation BE, the Refuge estimates that approximately 60 percent of its acreage, about 70,309 acres, is potential Pima pineapple cactus habitat. This acreage is all included within the fire management units. Based upon information in the Arizona's Heritage Data Management System, there were 65 known sites on the Refuge in 2001. Much of the Refuge is still unsurveyed.

B. Factors affecting species environment within the action area

Pima pineapple cactus within the action area are protected from most of the threats faced by this species off the Refuge, such as, urban development, mining, and recreational off-road vehicle use. However, ground disturbances from Arizona Department of Transportation maintenance activities, specifically the clearing of a 30-foot recovery zone in some areas along the sides of SR 286, may disturb individuals that may be growing near the road side. Past road improvement projects, such as a bridge replacement and road realignment, may have resulted in the loss of individuals. Several acres of habitat were converted to highway roadway. In addition, several roadside fires have impacted the habitat along the highway.

Human disturbance in the action area, while localized, could have a substantial effect on Pima pineapple cactus. Wildlife-related recreational activities on the Refuge are not thought to affect pineapple cactus as these activities are primarily in developed areas of the Refuge. A more serious human disturbance is the large number of undocumented aliens and drug traffickers moving through the action area. New trails are created regularly, and campfires left unattended or used to signal for help pose substantial threat to this cactus. In addition, the use of off-highway vehicles by Border Patrol while monitoring and apprehending these individuals could present a significant impact on this species.

Prescribed fire has been used as a habitat management tool on the Refuge since it was established. The effects of a decade of prescribed fire on the spread of Lehmann lovegrass has yet to be evaluated.

Cactus ferruginous pygmy-owl

A. Status of the species within the action area

The Refuge is located in the southern portion of the Altar Valley. This valley has been identified as a recovery area for the pygmy-owl, by the Cactus Ferruginous Pygmy-owl Recovery Team. They identified this area as important in maintaining breeding habitat and allowing movement of pygmy-owls from northwest Tucson into Mexico and the Tohono O'Odham Nation. This valley presently has seven known sites occupied by individuals, one of these is on the Refuge (Abbate pers com). Much of the Refuge has not been surveyed in accordance with the current approved survey protocol.

There have been four breeding pairs and ten other individuals found in this area in the past (Harris Environmental Group, Inc. 1998; Flesch 1999; Abbate et al. 2000). In 1999, 18 adult owls and four nests were located within the Altar Valley (Pima County, 1999). Arizona Game and Fish Department located 8 adults and 1 nest site in 2000, and 18 adults and 7 nest sites in 2001. The drop in individuals in 2000 is related to an inability to access an area where owls were located in 1999. Currently, in 2002, survey and monitoring efforts are on going. A total of 6 adult owls and 2 nests have been located, including three locations on the Refuge. A leg-banded female from 2001 was located this spring, a second bird was located and radio tagged, and a third was detected in a fire management unit proposed for a burn next year (Abbate pers com and Huniccutt pers com).

B. Factors affecting species environment within the action area

This species is potentially limited by available nest sites within the Valley. Saguaro cactus, the common nesting site for pygmy-owls, is an infrequent component of the vegetation community on the Refuge. Alternative nesting substrate includes larger trees (>6 in. dbh) which are of a size that could provide cavities for nesting. While mesquite trees of this size or larger were historically common in this valley, they are currently found scattered in xeroriparian areas along washes that run through the valley (Sayre 1999).

The dispersed nature of suitable nesting sites throughout the valley makes the need to maintain connectivity throughout the valley very important. Arizona Department of Transportation maintenance activities resulted in the clearing of a 30-foot recovery zone in some areas along each side of SR 286, effectively increasing the interruption of habitat continuity resulting from the road from a 24-foot gap in the habitat to an 84-foot gap. In addition, several roadside fires have modified the habitat along the highway. A bridge replacement and road realignment resulted in the loss of habitat and increased fragmentation.

Human disturbance in the action area discussed above can also result in harassment of individuals, nesting adults, and the loss of habitat resulting from escape of unattended campfires.

EFFECTS 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. Those portions of the proposed draft CCP and the amendments in the BE which will not affect Pima pineapple cactus, pygmy-owl or other listed species are not addressed further. These include administrative actions, education related actions, research activities that are non-invasive or compilations of existing data, and construction projects that involve remodeling, rehabilitation, and maintenance of existing structures with no outside disturbance.

Recreation

Proposed actions to improve wildlife-related recreation on the Refuges are not likely to have direct affects on listed species on the Refuge. Improving the wildlife-related recreational opportunities on the Refuge may result in an increase in public visitation to the Refuge. Visitation will be monitored by the Refuge to ensure that it does not result in harassment of pygmy-owls.

Research and Monitoring

Research and monitoring of listed species are permitted under 10(a)1(A) recovery and restoration permits. The effects of these actions are analyzed for each permit application. Therefore, the effects of proposed actions in the CCP related to research and monitoring of listed species will not be part of this consultation. Research and monitoring of non-listed species, vegetation changes, and archeological resources may have minor, short-term direct effects from disturbance to listed species, but this should be infrequent and of an intensity to be insignificant relative to other natural disturbances. Monitoring of the hunting program quality and the size of the safety area around Refuge structures should have no effect on listed species.

The CCP also proposes, as part of a future land acquisition, to establish a grazing demonstration/research project. Due to the lack of site-specific information concerning the location, size of the project, and knowledge of listed species occupancy, we are unable to address the potential effects of this proposed action at this time. We recommend that the Refuge discuss this action with us when more detailed information is available and initiate consultation for this proposed action, if appropriate.

Habitat Enhancement and Restoration

The proposed action to use prescribed fire to restore the native grassland in the Grassland Unit of the Refuge was consulted on under the Refuge Fire Management Plan (USFWS 2002a) and will not be readdressed as part of this consultation.

The proposed seeding in grassland habitats will involve ground disturbance for the preparation of the soil and the actual seeding. This will most likely be accomplished through the use of farm or heavy machinery. Pima pineapple cactus are susceptible to injury and mortality from crushing by machinery and vehicles. In addition, the seeding of an area may have an effect on Pima pineapple cactus seeds within the seedbank of a treatment area. The combination of ground disturbance and planting of native plant species could have an effect on germination and survival of young cactus. This effect could be negative or positive dependent on the microclimates created and the response of cactus seeds and young plants to the changes in the plant community. Mortality or injury of pygmy-owls are not expected to result from these actions as proposed, with adequate protection of wooded washes and saguaro cacti. Indirect effects are also not likely with pygmy-owl surveys being conducted for two years prior to seeding activities within or near ($\leq$ 0.25 mile) suitable habitat.

The limited use of herbicide is proposed to control invasive exotic plant species and invasive shrubs and trees in the grassland habitats. Initial use will be on an experimental basis. Limited use of herbicides in accordance with Environmental Protection Agency (EPA)/Manufacturer labeling will pose little chance of adversely affecting listed species. However, large-scale use could result in the death of pineapple cactus, and the loss of saguaro cacti could indirectly affect pygmy-owls. The effects of large-scale use of herbicides on the Refuge can not be quantified at this time as information on acreage and locations of treatment are not known. We recommend further consultation occur on any use of herbicide greater than spot treatments, if the usage could affect listed species. The control of a newly discovered exotic invasive plant species on the Refuge can be consulted on as an emergency action.

The use of prescribed fire to control cattails and other riparian vegetation is also proposed. The burning of cattails could result in a rapid change in water chemistry with the input of ash and various minerals found in the tissue of aquatic plants. There are currently no known listed aquatic species within Arivaca Cienega or Arivaca Creek. Therefore this action should have no affect on listed aquatic species. Southwestern willow flycatchers have been reported in the riparian habitats along Arivaca Cienega and Creek during the non-breeding season. The use of fire, mechanical methods, or herbicide to control approximately 5 acres of cattails out of the 40-acre Cienega may move flycatchers and cuckoos away from the treatment area. However, only 1/8 of the cienega will be treated in any one year, and the riparian area along Arivaca Creek will not be treated. No long-term or significant harm is anticipated for these species during the non-breeding season.

The proposed Arivaca Creek and Cienega restoration projects involve the manipulation of habitat to eventually improve degraded riparian habitats (1.5.D). This proposal includes the planting of trees, gabion construction, and upland restoration. Due to the lack of project-specific information we are unable to determine specific effects of these proposed actions. We recommend that the Refuge consult with our office on the effects of specific restoration projects when more site-specific information is available, if appropriate.

The creation of a wetland demonstration area (5.2.A) will result in the conversion of 1 acre of grassland habitat to a hardwood riparian habitat. This action could remove 1 acre of habitat suitable for Pima pineapple cactus and pygmy-owls. If Pima pineapple cactus are present in the one-acre project site they may be crushed by construction equipment, or the inundation of the area with water would make the habitat unsuitable for pineapple cactus. It is anticipated that the creation of riparian habitat could be beneficial effects for pygmy-owls through the creation of potential nest sites.

Land Acquisition

The draft CCP identifies several proposed land acquisition objectives. The effects of particular land acquisitions are not expected to be negative for any listed species found within the action area. However, at this time site-specific information is not available for any future acquisitions and specific effects analysis cannot be completed. If the Refuge anticipates effects to listed species from a specific land acquisition, we recommend they contact us to initiate consultation on the land acquisition in question.

Construction

Construction of new facilities to improve Refuge infrastructure, masked bobwhite quail brooding and rearing facilities, and general visitor facilities are proposed in the draft CCP. In addition, the Refuge proposes to delineate the refuge boundary through signage and fencing to better identify land ownership. Pima pineapple cacti may be crushed by construction equipment, if they occur in areas planned for construction. In the grassland unit of the Refuge, pygmy-owls may be disturbed by noise of construction activities. Indirect effects on pygmy-owls and pineapple cactus could occur through the loss or increased fragmentation of habitat, loss of pygmy-owl prey species, and the loss or the pineapple cactus seed bank and suitable habitat. The conservation measures proposed by the Refuge as part of these actions to survey for pygmy-owls in accordance with the established protocol, breeding season avoidance of disturbances, and the development of a pygmy-owl management plan will minimize the likelihood of these effects. The surveys for pineapple cactus prior to construction, data collection on cactus locations, and the development of the predictive model as part of the conservation measures will also minimize effects of construction activities to Pima pineapple cactus. However, due to the lack of project-specific information we are unable to determine specific effects of these proposed actions. We recommend that the Refuge consult with our office on the effects of specific construction projects when more site-specific information is available, if appropriate.

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.

The Altar Valley Conservation Alliance is a group of ranchers who own private property and hold state and federal grazing leases within the Altar Valley. They have been working on a valley-wide inventory of the ecological condition of the watershed under an Arizona Water Protection Fund Grant. They are currently working with the data from the inventory to develop watershed restoration projects, a fire management plan, and to improve livestock management on the State Trust and Private lands.

Diamond Bell Estates is a development at the north end of the Altar Valley, Township 16S, Range 10E, section 29. The roads for this development were constructed several years ago and the utilities were being proposed for this past year. We understand that the 205-acre project is being developed, and contrary to our recommendations no consultation has occurred through the EPA storm water discharge program of the Clean Water Act.

Arizona Department of Transportation has plans to improve SR 286 at MP 28.5. This project will include replacing a drop structure and straightening out a curve. This will result in the realignment of the road. This project is currently slated for construction by late 2003. It is expected to be funded through the State of Arizona. The area of impact will not be known until the design specifications are completed. However, it is likely that this project will occur in the next five years.

CONCLUSION

After reviewing the current status of Pima pineapple cactus, and cactus ferruginous pygmy-owl, the environmental baseline for the action area, the effects of the proposed Refuge CCP and the cumulative effects, it is the Service's biological opinion that the actions, as proposed within the BANWR CCP as amended by the Biological Evaluation for the CCP, are not likely to jeopardize the continued existence of the Pima pineapple cactus and cactus ferruginous pygmy-owl. No critical habitat has been designated for these species, therefore, none will be affected. Our findings are based upon the following:

Pima pineapple cactus

1. Surveys will be conducted prior to ground-disturbing activities.

2. Development of a predictive model as part of the proposed action will assist in long-term management of this species.

3. Proposed activities are not expected to result in significant habitat disturbance or loss of individual cacti.

Cactus ferruginous pygmy-owl

1. All proposed actions covered under this consultation that could result in loss of pygmy-owls will be proceeded by 2 years of surveys.

2. The highest quality habitat for nesting and dispersal will be protected from disturbance.

3. Disturbance of listed species by visitors to the Refuge will be monitored.

4. A comprehensive management plan for this species will be developed within 3 years.

The conclusions of this biological opinion are based on full implementation of the proposed projects as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design. Those portions of the proposed action that were excluded from this consultation, were done so due to the lack of specific information on the scope of the project, the specific area, and the species' occurrence.

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.

EXTENT OF TAKE

Pima pineapple cactus

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

Cactus ferruginous pygmy-owl

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

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species, initial notification must be made to the Service's Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: 480/835-8289) 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 animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

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 affects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that as part of any grassland reseeding project, the Refuge monitor the germination of any pineapple seeds and their survival over time to determine the effects of this type of habitat restoration on this species.

2. Since nesting cavities are thought to be a limiting factor within the Altar Valley, we recommend that the Refuge work to place nest boxes within suitable habitat on the Refuge. These boxes should be monitored for occupancy rates to determine if nest sites are truly

limiting in the valley. If nest boxes prove to be successful, the Refuge should incorporate this augmentation of nesting habitat into the proposed management plan for pygmy-owls on the Refuge.

3. We recommend that the Refuge work to restore the Altar Wash to a functioning flood plain system. The Refuge has already embarked on a process to restore the upland habitats for masked bobwhite, but the stands of sacaton (*Sporobolus* spp.), once found along the terraces of the Altar Wash, are currently missing from this valley and thought to be of value to this species (King 1998).

4. We recommend continued work on the restoration of aquatic habitats on the Refuge for the reintroduction of Chiricahua leopard frogs onto the Refuge.

5. We recommend continued cooperation with our office, AGFD, University of Arizona, and neighboring landowners to reestablish the Chiricahua leopard frog meta-population within the Altar Valley.

6. We recommend that the Refuge inventory agaves (*Agave* spp.) and saguaros on the Refuge. These populations should be monitored to determine the long-term sustainability of these forage species for lesser long-nosed bats.

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

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the Refuge CCP. 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 appreciate the Refuge's efforts to identify and minimize effects to listed species from this project. For further information please contact Marty Tuegel at (520) 670-4778 or Sherry Barrett

at (520) 670-4617. Please refer to the consultation number, 2-21-02-F-207, in future correspondence concerning this project.

/s/ Steven L. Spangle

cc: Assistant Regional Director, Ecological Services, Fish and Wildlife Service, Albuquerque, NM (Attn: Section 7 Coordinator)

Regional Supervisor, Region V Office, Arizona Game and Fish Department, Tucson, AZ
Director, Arizona Game and Fish Department, Phoenix, AZ

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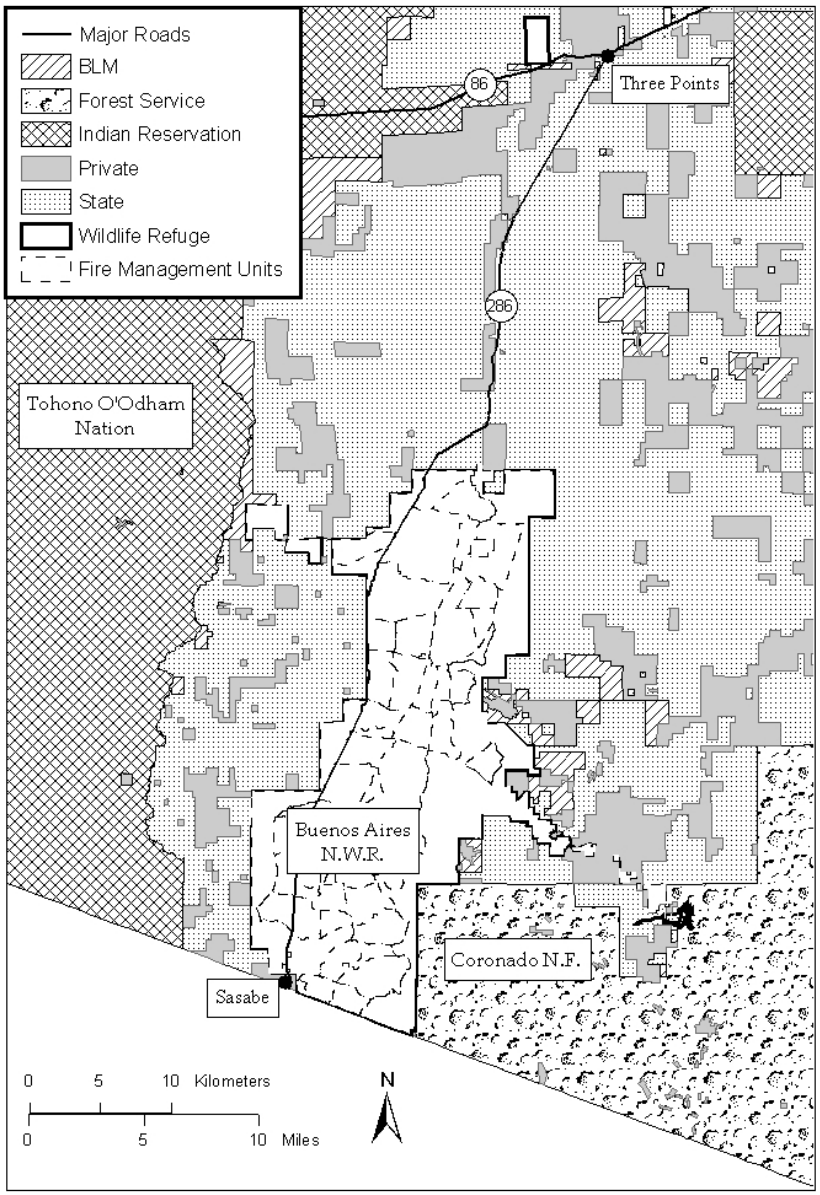
TABLES AND FIGURES

Figure 1. Action Area



APPENDIX A: CONCURRENCES

Kearney's bluestar (*Amsonia kearnyana*),

Environmental Baseline

Kearney's bluestar was listed as endangered in January 1989 without critical habitat. An herbaceous perennial in the Dogbane family (Apocynaceae), it is a sub-shrub with a thickened woody root and many pubescent (hairy) stems that rarely branch. The stems are erect to ascending with alternate, oblong-lanceolate to lanceolate leaves. The leaves are 3.8-6.9 cm (1.5-2.7 in) long, 1.5 cm (0.6 in) broad and are soft and bright green with short petioles. White flowers form a terminal inflorescence in late April and May. The flowers show characteristics of moth pollination. The fruit is a follicle born singly or in pairs at the end of stems and develops in June-August.

Plants grow in stable, partially shaded, coarse alluvium along a dry washes at 1,097 - 1,158 m (3,600-3,800 ft) elevation. These washes are typically lined with desert riparian trees and shrubs such as Arizona walnut (*Juglans major*), Mexican blue oak (*Quercus oblongifolia*), and velvet mesquite (*Prosopis velutina*). This vegetation surrounding the washes is Sonoran desertscrub or desertscrub-grassland transition zone. It is known on the Refuge from a west-facing drainage in the Baboquivari Mountains, Pima County and potentially could be in other west-facing drainages in the Baboquivari Mountains.

This species is vulnerable to extinction because of the relatively limited distribution and perhaps insufficient reproduction. Because the plants occur along the margins of a steep wash that floods periodically, the population is susceptible to destruction from major flood events. The species is also threatened by overuse of the habitat by livestock.

In fall 1988 and winter 1989, 181 individuals of this species were transplanted into a canyon on the east side of the Baboquivari Mountains to create a living biological reserve for the species. During the summer of 1990, a flood removed many of the individuals that had survived the transplant. In mid-1990, 33 of the original 181 plants were surviving. Another planting was made in winter 1992. The Refuge population of transplanted individuals consists of approximately 50 individuals within this population which occupy less than 1/4 acre.

Conservation Measures

- Use of pesticides and herbicides will be severely restricted within riparian areas and near water. Only those pesticides/herbicides approved for use in those areas will be used. If used, application methods will be extremely site specific and conservative in application and will be used only to eradicate invasive species posing an immediate threat to wildlife or their habitat.

- Construction will not take place where it could affect the continued survival of the Kearney's bluestar.

- Fire will be suppressed within riparian areas.

Conclusions

After reviewing the status of the Kearney's bluestar, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs that the proposed action may affect, but is not likely to adversely affect Kearney's bluestar, based upon the following:

- Most actions are covered in this consultation are not located in the area of these plants.

- The location of these plants is known and they are easy to avoid for those actions in the area of these plants.

- Conservation measures will be implemented to avoid adverse effects.

Masked bobwhite quail (*Colinus virginianus ridgwayi*)

Environmental Baseline

Masked bobwhite quail was listed endangered on March 11, 1970, without critical habitat. Males are characterized by a brick-red breast and a black head and throat. Females closely resemble other races of the species and are essentially indistinguishable from the Texas bobwhite (*Colinus virginianus texanum*). They are found in desert grasslands at 300-1,200 m (1,000 - 4,000 ft) elevation with a high diversity of moderately dense native grasses and forbs and adequate brush cover. This subspecies has been found to be closely associated with unarmed acacia (*Acacia angustissima*), apparently using the seeds as a major food in winter, fall, and early spring.

Historically masked bobwhite quail occurred in grasslands throughout most of Sonora, Mexico, and the Altar and Santa Cruz valleys of Pima and Santa Cruz counties, Arizona. They inhabited the Sonoran savanna grasslands, the Sonoran desertscrub, and the Sinaloan thornscrub of extreme southcentral Arizona and adjacent central Sonora, Mexico.

This species was extirpated from the United States around 1900. A refuge population and captive rearing was established in 1985 at the Refuge. In 1996, it was estimated that there were 300-500 masked bobwhite on the Refuge. In 2001, a population of 644 individuals were estimated based upon call count surveys (Mary Hunnicutt, pers. com.). Three very small natural populations still persist in central Sonora, Mexico, consisting of fewer than 1,000 individuals.

The reason for decline was thought to be the result of the loss and deterioration of habitat due to overgrazing and possibly due to competition with other native species of quail.

Conservation Measures

- Prescribed burning activities will take place outside the nesting season for masked bobwhite. By conducting prescribed fire activities in May and June, the monsoonal breeding season will be avoided.

- Prescribed fire will not take place in large blocks of fire management units, but will be distributed such that there is always appropriate habitat available to the quail. Adjacent fire management units will generally not be burned within the same year.

- Construction activities in areas known to be inhabited by masked bobwhite will be suspended in an area within 100 yards of suspected active nests.

Conclusion

After reviewing the status of the masked bobwhite quail, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs that the proposed action may affect, but is not likely to adversely affect masked bobwhite quail, based upon the following:

- New construction, herbicide treatments, and the grazing demonstration project, which could result in loss of masked bobwhite quail, will occur outside the breeding season.

- The proposed actions to improve the grassland unit of the Refuge should be beneficial to this species.

- Conservation measures will be implemented to avoid adverse effects to masked bobwhite quail.

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)

Environmental Baseline

Lesser long-nosed bat was listed as endangered without critical habitat on September 30, 1988 (53 FR 38456). It is a medium-sized bat with yellowish-brown or pale gray above and cinnamon-brown below; a slender elongated nose with a small nose-leaf on the tip; a minute tail; and body length of 7 to 9.5 cm (2.7 to 3.7 in). It is slightly smaller than the Mexican long-nosed bat.

Lesser long-nosed bats occur mainly in desertscrub habitat in the U.S. portion of their range. In Mexico, the species occurs up into high elevation pine-oak and ponderosa pine forests. They

occur at elevations ranging from 480-3,450 m (1,600-11,500 ft). Roosting is in caves, abandoned mines, and unoccupied buildings at the base of mountains where agave, saguaro, and organ pipe cacti (*Stenocerus thurberi*) are present. This species forages at night on nectar, pollen, and fruit of paniculate agaves and columnar cacti. Historically this species ranged from central Arizona and southwest New Mexico through much of Mexico to El Salvador. Currently this species is found throughout most of its historical range, but the number of occupied roost sites and the number of individuals per colony have recently declined drastically. These bats are seasonal (April - September) residents of southeastern Arizona, and possibly extreme western Arizona (Cochise, Pima, Santa Cruz, Graham, Pinal and Maricopa counties, Arizona).

Considerable evidence exists for the interdependence of *Leptonycteris* bat species and certain agaves and cacti. Excess harvest of agaves in Mexico, the collection of cacti in the U.S., and the conversion of habitat for agricultural uses, livestock grazing, wood-cutting, and other development may contribute to the decline of long-nosed bat populations. These bats are particularly vulnerable due to many individuals using only a small number of communal roosts.

Conservation Measures

- Saguaro cacti and agaves (both of which provide food for the lesser long-nosed bat) will be protected from the effects of prescribed fire.

Conclusion

The Service concurs with the Refuge determination that the action may affect, but is not likely to adversely affect lesser long-nosed bat, based upon the following:

- There are no known roost sites, and lesser long-nosed bats are only known to use the Refuge to forage.

- The actions included within this consultation are not located near the majority of forage plants for this species.

- Saguaro cactus and agaves will be protected from habitat restoration and enhancement projects within the plan.

- Conservation measures will be implemented to avoid adverse effects.

Jaguar (*Panthera onca*)

Environmental Baseline

We listed the jaguar as endangered in the U.S. in a Federal Register notice (62 FR 39147), dated July 22, 1997, without critical habitat. The largest species of cat native to the Western

Hemisphere, the jaguar is muscular, with relatively short, massive limbs, and a deep-chested body. It is cinnamon-buff in color with many black spots, and weights range widely from 40 to 135 kg (90 to 300 lb), with lengths from 2.4 m (7.8 ft) from head to tail tip. Found near water in the warm tropical climate of savannah and forest, jaguar are rarely found in extensive arid areas. Individuals located in Arizona have been found in Sonoran desert scrub up through subalpine conifer forest vegetation types.

Its historical range was from the southwestern United States (including California, Arizona, New Mexico, Louisiana, and south through Texas) and into central South America. In Arizona, it was observed in mountainous areas in portions of eastern Arizona to the Grand Canyon. Its current range is thought to be from central Mexico and into central South America, as far south as northern Argentina. There are no known breeding populations in the U.S. Individuals may cross into Texas, New Mexico, and Arizona. The most recent, clearly documented individual in Arizona was observed in southern Arizona in December 2001. Threats include loss and modification of habitat, poaching and shooting by humans, and predator control activities.

Conclusion

The Service concurs with the Refuge determination that the action may affect, but is not likely to adversely affect jaguar, based upon the following:

- The jaguar is a wide-ranging species and is only found sporadically in the action area.

- The size of actions included in this consultation are not likely to affect this species.

Chiricahua leopard frog (*Rana chiricahuensis*)

Environmental Baseline

Chiricahua leopard frog was listed as threatened on June 13, 2002, without critical habitat (67 FR 40790). This species of leopard frog has a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back. The species also has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration. Snout-vent lengths of adults range from approximately 54 to 139 mm (2.1 to 5.4 in). The Ramsey Canyon leopard frog *(Rana subaquavocali*s) is similar in appearance to the Chiricahua leopard frog, but it often grows to a larger size and has a distinct call that is typically given under water. Populations of Chiricahua leopard frog on the Mogollon Rim are disjunct from those in southeastern Arizona. The Rim populations may be described as a separate species.

The Chiricahua leopard frog is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 1,000 to 2,710 m (3,281 to 8,890 ft) in central and

southeastern Arizona (Santa Cruz, Apache, Gila, Pima, Cochise, Greenlee, Graham, Yavapai, Coconino, and Navajo counties, Arizona); west-central and southwestern New Mexico; and in Mexico, in northern Sonora, and the Sierra Madre Occidental of Chihuahua, northern Durango and northern Sinaloa. The distribution of the Chiricahua leopard frog in Mexico is unclear. In recent years, 1995-2000, the species was observed at 60 localities in Arizona. In New Mexico, the species was found at 41 sites from 1994 -1999; 31 of those were verified extant during 1998-1999. The species has been extirpated from about 75 percent of its historic localities in Arizona and New Mexico.

The species' potential habitat would include all historical localities and most permanent or nearly permanent aquatic sites within its range. However, many of these sites are probably not restorable due to introduction of nonnative predators, habitat degradation, or other factors. Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and destruction of habitat; water diversions and groundwater pumping; disruption of metapopulation dynamics (relationships between populations of frogs); increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination.

The species is still extant in all major drainages in Arizona and New Mexico where it occurred historically; however, it has not been found recently in many rivers, valleys, and mountain ranges, including the following in Arizona: White River, East Clear Creek, West Clear Creek, Silver Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, Sonoita Creek, Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. In many of these regions Chiricahua leopard frogs were not found for a decade or more despite repeated surveys.

Conservation Measures

- Use of pesticides and herbicides will be severely restricted within riparian areas and near water. Only those pesticides/herbicides approved for use in those areas will be used. If used, application methods will be extremely site specific and conservative in application and will be used only to eradicate invasive species posing an immediate threat to wildlife or their habitat.

- Construction will not take place where it will cause siltation of tanks holding Chiricahua leopard frogs or razorback suckers or where it could affect the continued survival of the Kearney's bluestar.

- Fire will be suppressed within riparian areas. When fire activities require drawing of water from tanks, use of tanks containing razorback suckers and Chiricahua leopard frogs will be prohibited.

Conclusion

The Service concurs with the Refuge determination that the action may affect, but is not likely to adversely affect Chiricahua leopard frog, based upon the following:

- The last known location of Chiricahua leopard frogs on the Refuge dried up in 2001 and no individuals have been located at this location

- Conservation measures will be implemented to avoid adverse effects.

Razorback sucker (*Xyrauchen texanus*)

Environmental Baseline

Razorback sucker was listed as endangered on October 23, 1991 (56 FR 54957), and critical habitat was designated for this species on March 21, 1994 (59 FR 13379). This species is characterized by a head that is flattened on top, and the body is stout with olive-brown above to yellowish on the belly. A long, high, sharp-edged keel-like hump is found behind the head. The head and tail are quite dark in breeding males. Razorback suckers can grow to 0.9 m (3 ft) in length and over 2.7 kg (6 lbs) in weight.

Razorback suckers are found in backwaters, flooded bottomlands, pools, side channels, and other slower moving habitats under 1,829 m (6,000 ft) elevation. Historically, razorback suckers were found in areas near strong currents. They are endemic to the Colorado River Basin and formerly occurred in all major rivers and larger streams in the basin. They were once the most widespread and abundant of the basin's big-river fishes. Their current distribution in the Lower Colorado Basin is limited to populations that are isolated in lakes Mohave and Mead, and the lower Colorado River below Havasu. In the Upper Basin, small remnant populations are found in the Green, Yampa, and mainstream Colorado rivers. It is also found in the San Juan River near the New Mexico-Utah border. The species is found in parts of Greenlee, Mohave, Pinal, Yavapai, Yuma, La Paz, Maricopa, Gila, Coconino, and Graham counties, Arizona. Currently, populations are being reared at Willow Beach and Dexter National Fish Hatcheries, and Bubbling Ponds State Fish Hatchery. Reintroductions have been done in the Gila, Salt, and Verde rivers. The Colorado River Indian Tribe hatchery and the Bureau of Reclamation are important components in an ongoing program to replace the aging population in Lake Mohave, restore the Lake Havasu population, and increase the lower Colorado River populations.

Alteration of river conditions and loss of habitat caused by dam construction, irrigation dewatering and channelization; and introduction of exotic fish species, such as black bullhead, carp, and channel catfish are the primary causes of the decline of razorback suckers.

The razorback sucker was introduced by AGFD into 12 of the water tanks on the Refuge in the 1980s with the intention of growing them to a size where they would not be preyed upon

extensively once released. After 3 years, seven of the ponds were seined and the fish were released into the Salt River, while four of the five remaining ponds went dry. One pond, Rock Tank, was missed in the recapture effort. In 1998 refuge personnel rediscovered fish in the tank where they had apparently survived and were reproducing. The fish were redistributed to two other tanks to counter oxygen depletion in Rock Tank. As of June 2001, all remaining razorback suckers were removed and shipped to Lake Havasu. The Refuge may provide water tanks for growing out razorback suckers in the future.

Conservation Measures

- Use of pesticides and herbicides will be severely restricted within riparian areas and near water. Only those pesticides/herbicides approved for use in those areas will be used. If used, application methods will be extremely site specific and conservative in application and will be used only to eradicate invasive species posing an immediate threat to wildlife or their habitat.

- Construction will not take place where it will cause siltation of tanks holding Chiricahua leopard frogs or razorback suckers or where it could affect the continued survival of the Kearney's bluestar.

- Fire will be suppressed within riparian areas. When fire activities require drawing of water from tanks, use of tanks containing razorback suckers and Chiricahua leopard frogs will be prohibited.

Conclusion

The Service concurs with the Refuge determination that the action may affect, but is not likely to adversely affect razorback suckers, based upon the following:

- This species is not currently present within the action area.

- Any introduction on to the Refuge would be part of a recovery action and effects will be assessed at that time.

- All actions covered in this consultation are located away from suitable aquatic habitat for this species.

- Conservation measures will be implemented to avoid adverse effects.

Southwestern Willow Flycatcher (*Emphidonax trailli extimus*)

Environmental Baseline

Southwestern willow flycatcher was listed endangered on February 27, 1995, without critical habitat (60 FR 10694). Critical habitat was designated on July 22, 1997 (62 FR 39129), but was set aside by the 10th Circuit Court of Appeals on May 11, 2001.

Southwestern willow flycatcher is a small, migratory bird about 15 cm (6 in) long, with grayish-green back and wings, a white throat, a light gray-olive breast, and a pale yellowish belly. Two wingbars are visible and the eye ring is faint or absent. It occurs in dense riparian habitats along streams, rivers, and other wetlands where cottonwood, willow, boxelder, tamarisk, Russian olive, buttonbush, and arrowweed are present. Nests are found in thickets of trees and shrubs about 4-7 m (13-23 ft) in height, among dense and homogenous foliage. Habitat occurs at elevations below 8,500 ft (2,590 m). The historical range of this species includes southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico. It is currently extirpated from much of its historical range, with just over 900 breeding pairs currently documented in the Southwest. Remnant populations survive in historical locations. Individuals in Arizona are found on the upper Gila River, Little Colorado River, the middle Salt River, the lower San Pedro River, Colorado River, San Francisco River, Hassayampa River, the upper Verde River, Big Sandy River, Santa Maria River, Tonto Creek, and the Bill Williams River. Southwestern willow flycatchers most likely winter in Mexico, Central America, and possibly northern South America.

The decline of this species is primarily due to riparian habitat reduction, degradation, and elimination as a result of agricultural and urban development. Other reasons for the decline/vulnerability of the flycatcher include: the fragmented distribution and low numbers of the current population; predation; brood parasitism by cowbirds; and other events such as fires and floods that are naturally occurring, but have become more frequent and intense as a result of the proliferation of exotic vegetation and degraded watersheds, respectively.

Southwestern willow flycatchers have been documented on the Refuge during migration only. No birds have been known to nest here, though appropriate habitat is available. Currently appropriate habitat exists along Arivaca Creek and Arivaca Cienega. There is riparian habitat in Brown Canyon, but it tends to be sparse and narrow and does not appear to be suitable at the current time. Potential habitat makes up only about 1 percent of the refuge acreage.

Conservation Measures

- Use of pesticides and herbicides will be severely restricted within riparian areas and near water. Only those pesticides/herbicides approved for use in those areas will be used. If used, application methods will be extremely site specific and conservative in application and will be used only to eradicate invasive species posing an immediate threat to wildlife or their habitat.

- Fire will be suppressed within riparian areas.

Conclusion

The Service concurs with the Refuge determination that the action may affect, but is not likely to adversely affect southwestern willow flycatcher, based upon the following:

- The only known occurrences on the Refuge are migrating individuals.
- Actions that are proposed within Riparian habitats are small and not likely to result in loss of habitat.
- The proposed restoration and creation of additional habitat as part of this action may be beneficial to this species.
- Conservation measures will be implemented to avoid adverse effects to southwestern willow flycatchers.

Mountain Plover (*Charadrius montanus*)

Environmental Baseline

The mountain plover was proposed threatened, without critical habitat in 1999 (64 FR 7587). The mountain plover is a small bird (about 17.5 cm) (7 in), about the size of a killdeer (*Charadrius vociferus*). It is light brown above with a lighter colored breast, but lacks the contrasting dark breastbelt common to many other plovers. During the breeding season it has a white forehead, a white stripe above the eye, and a dark line between the beak and eye, which contrasts with the dark crown. During winter, the dark line is absent and the crown is lighter, but the white eyestripe and white forehead remain. The voice of the bird is low with a variable whistle.

Mountain plover breeding habitat is known to include short-grass prairie (vegetation less than 10 cm (4 in) tall) and shrub-steppe landscapes; dryland, cultivated farms; and prairie dog towns. Short vegetation, bare ground, and a flat topography are recognized as habitat-defining characteristics at both breeding and wintering locales. Breeding occurs in the Western Great Plains and Colorado plateau from 1220 to 2140 m (approx. 4,000 to 7,200 ft). Plovers usually nest on sites where vegetation is sparse or absent, due to disturbance by herbivores, including domestic livestock and prairie dogs. Mountain plovers are rarely found near water. They may be found on heavily grazed pastures throughout their breeding range and may selectively nest in or near prairie dog towns. Wintering mountain plovers generally arrive in Arizona in November, and begin leaving for breeding areas by mid-March and may make a nonstop migration to breeding grounds. Although cultivated land is used by wintering mountain plovers and is more abundant than non-cultivated land, mountain plovers appear to prefer alkali flats, burned grasslands, and livestock-grazed annual grasslands to cultivated sites. Wintering habitat elevation is variable but generally occurs in valley bottoms below 300 m (1,000 ft).

Historically, breeding mountain plovers were reported as locally rare to abundant, and widely distributed in the Great Plains region from Canada south to Texas. Mountain plovers have been observed during the winter in California, Arizona, Texas, and Nevada. Grazing herbivores historically dominated the grassland landscape at both breeding and wintering sites, and their grazing, wallowing, and burrowing activities created and maintained a mosaic of vegetation and bare ground to which mountain plovers became adapted. Currently, the species is primarily found in Rocky Mountain states from Canada to Texas. Arizona primarily provides wintering habitat for the species. Breeding has been documented in Apache County, Arizona, but it is rare. In Arizona, mountain plovers have been located in Yuma, Pima, Cochise, Pinal, and Apache counties. Mountain plover habitat is threatened by the conversion of grasslands to croplands and urban uses, domestic livestock management, and other land uses (e.g., prairie dog control, mineral development) throughout mountain plover breeding and wintering range.

No records of the mountain plover are known from the Refuge. However, the habitat could be appropriate during the winter months, and the bird occurs both to the east and west of the Refuge. Wintering areas can include grasslands, but most of the wintering populations utilize agricultural lands.

Conclusion

The Service concurs with the Refuge determination that the action may affect, but is not likely to adversely affect this species based upon the following:

- There are no known occurrences of this species on the Refuge.
- The use of semi-desert grasslands in southern Arizona by this species is in the winter, non-breeding season.
- The actions within the CCP may enhance habitat for this species.

Yellow-billed cuckoo (*Coccyzus americanus*)

Environmental Baseline

The yellow-billed cuckoo was proposed as a Distinct Vertebrate Population Segment west of the crest of the Rocky Mountains, but precluded by higher priority listing actions on July 25, 2001 (66 FR 38611).

The yellow-billed cuckoo is a medium-sized bird of about 30 cm (12 in) in length, and weigh about 60 g (2 oz). The species has a slender, long-tailed profile, with a fairly stout and slightly down-curved bill, which is blue-black with yellow on the basal half of the lower mandible (bill). Plumage is grayish-brown above and white below, with rufous primary flight feathers. The tail

feathers are boldly patterned with black and white below. The legs are short and bluish-gray, and adults have a narrow, yellow eye ring. Juveniles resemble adults, except the tail patterning is less distinct, and the lower bill may have little or no yellow. Males and females differ slightly, as males tend to have a slightly larger bill.

Habitat for the species in the eastern U.S. consists of parks, riparian woodlands, and other deciduous woodlands. This is in contrast to habitat west of the Continental Divide, where suitable habitat is limited to narrow, and often widely separated, riparian cottonwood-willow galleries (salt cedar is also used by the cuckoo). Dense understory foliage appears to be an important factor in nest site selection, while cottonwood trees are an important foraging habitat in areas where the species has been studied in California. The species is usually found at elevations less than 2011 m (6,600 ft).

Based on historical accounts, the species was widespread and locally common in California and Arizona; locally common in a few river reaches in New Mexico; common very locally in Oregon and Washington; generally local and uncommon in scattered drainages of the arid and semiarid portions of western Colorado, western Wyoming, Idaho, Nevada, and Utah; and probably uncommon and very local in British Columbia. Based on a 1986–87 statewide survey, only three areas in Arizona supported more than about five breeding pairs on a regular basis. In the Pacific Northwest, the last confirmed breeding records were in the 1930s in Washington and in the 1940s in Oregon. The species may now be extirpated from Washington. Currently, Arizona contains probably the largest remaining cuckoo population among states west of the Rocky Mountains, but cuckoo numbers in 1999 are substantially less than some previous estimates for Arizona as habitat has declined. One hundred sixty-eight yellow-billed cuckoo pairs and 80 single birds were located in Arizona in 1999, based on preliminary results from a State-wide survey which covered 426 km (265 mi) of river and creek bottoms. Losses of riparian habitats from historical levels have been substantial in Arizona. Despite this, the cuckoo is still found in all counties in Arizona. In Colorado and Idaho, the species is rare, and in Nevada, the remaining breeding populations are threatened with extinction, if not already extirpated. The portion of Texas west of the Pecos River has been identified as within the range of the historical western subspecies, but other authors consider birds from this area most similar to eastern cuckoos. The species occurs in the portion of Texas west of the Pecos River, but its conservation status is unknown. The species is wide spread and uncommon to common in central and eastern Texas.

The loss, degradation, and fragmentation of riparian habitat have been identified as the primary factors causing yellow-billed cuckoo declines in the western U.S. Estimates of riparian habitat losses include 90–95 percent for Arizona, 90 percent for New Mexico, 90–99 percent for California, and more than 70 percent nationwide. Distribution, population, and trend data indicate that, although regional declines have occurred, the yellow-billed cuckoo is relatively common as a breeding bird in much of the eastern U.S.

Yellow-billed cuckoos habitat occurs on the Refuge primarily within riparian habitat of Arivaca Creek and Cienega. Additional appropriate habitat may occur in the vicinity of Tully's Well,

Carpenter Tank and San Luis Wash. Also, this species has been detected on point counts in Brown Canyon through the appropriate habitat there appears to be extremely patchy in its distribution. Yellow-billed cuckoos are relatively abundant on the Refuge, with many individuals occupying sub-optimal habitat of the mesquite-grassland association during the summer months.

Conservation Measures

- Use of pesticides and herbicides will be severely restricted within riparian areas and near water. Only those pesticides/herbicides approved for use in those areas will be used. If used, application methods will be extremely site specific and conservative in application and will be used only to eradicate invasive species posing an immediate threat to wildlife or their habitat.

- Construction projects in and around riparian areas will be minor in nature (photographic blind, boardwalk maintenance) and should be short in duration. No construction will take place near nest sites during the breeding season for the yellow-billed cuckoo.

- Fire will be suppressed within riparian areas.

Conclusion

The Service concurs with the Refuge determination that the action may affect, but is not likely to adversely affect this species and therefore not likely to jeopardize based upon the following:

- Projects within the riparian areas will avoid nesting season for yellow-billed cuckoo when possible and avoid nest sites if seasonal restrictions are not practical.

- Most of the actions included within this consultation are not located near yellow-billed cuckoo habitat.

- New construction and herbicide treatments should be consulted on with us when more site specific information is available, if appropriate.

- Conservation measures will be implemented to avoid adverse effects to yellow-billed cuckoos.