United States Department of the Interior

Fish and Wildlife Service
Arizona Ecological Services Field Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513

In Reply Refer to:

December 15, 2008

AESO/SE
22410-2005-F-0002

Mr. David L. McKay
USDA, Natural Resources Conservation Services
U.S. Courthouse – Federal Building
230 N. First Avenue, Suite 509
Phoenix, Arizona 85003-1733

RE: Altar Valley Fire Management Plan

Dear Mr. McKay:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated May 8, 2008, and received by us on May 12, 2008. At issue are impacts that may result from the proposed Altar Valley Fire Management Plan (AVFMP) covering the non-Federal portion of the Altar Valley, Pima County, Arizona.

The proposed action may affect:

- the threatened Chiricahua leopard frog (*Lithobates chiricahuensis*)
- and the endangered Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*).

In your letter, you requested our concurrence that the proposed action was not likely to adversely affect:

- the endangered jaguar (*Panthera onca*),
- the endangered Kearney's blue star (*Amsonia kearneyana*),
- the endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*),
- the endangered masked bobwhite (*Colinus virginianus ridgewayi*),
- the threatened Mexican spotted owl (*Strix occidentalis lucida*) and its critical habitat,
- and the endangered southwestern willow flycatcher (*Empidonax traillii extimus*) and its critical habitat.

Our concurrences with your determinations for these species are included in the Appendix of this biological opinion (BO). You also requested consultation on the yellow-billed cuckoo (*Coccyzus americanus*), a candidate for Federal listing. We do not consult on actions that may affect species that are not proposed or listed under the Act. We will, however, provide technical assistance on this species at your request.

This BO is based on information provided in the May 7, 2008 biological assessment, the October 3, 2007 draft environmental assessment, the September 18, 2008 Altar Valley Fire Management Plan 2008, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, prescribed and wildland fire management and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at the Arizona Ecological Services Office, Phoenix Office.

Consultation History

- May 13, 2008: We received the May 8, 2008, request to initiate section 7 consultation on the effects of the Altar Valley Fire Management Plan.
- May 23, 2008: We notified NRCS that the Consultation Package was received and contained adequate information to initiate formal consultation.
- August 27, 2008: We sent a request for 60-day extension of the consultation to NRCS.
- September 18, 2008: We received a revised final AVFMP that clarified the proposed action.
- September 16, 2008: NRCS agreed to a 60-day extension.
- November 5, 2008: We sent the Draft Biological Opinion to NRCS for review and mutually agreed on an extension to December 15, 2008.
- December 12, 2008: We received comments from NRCS on the Draft Biological Opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The NRCS has collaboratively developed the AVFMP to guide prescribed fire management for the next 10 years in the Altar Valley. The AVFMP will implement prescribed fire management to achieve improved range and watershed health. The AVFMP includes conservation measures to minimize adverse affects to listed species, monitoring, and an adaptive management program that allows the AVFMP to adjust to new information. The AVFMP also provides Altar Valley ranchers a clearly defined process that will remain predictable over the life of the plan.

Prescribed Fire Management Goals

The cooperating agencies have established the following goals of the AVFMP:

1. Integrate the fire management activities of all major non-Federal land users of the Altar Valley.
2. Minimize adverse effects of prescribed fire on listed and candidate species under the Act, as well as other fish and wildlife resources.
3. Provide for habitat enhancements for listed and candidate species under the Act, as well as other fish and wildlife resources.
4. Provide a voluntary landowner agreement template with which a landowner may participate in the implementation of prescribed fire.
5. Provide long-term watershed improvement.

Prescribed fire will be used across the landscape to produce and maintain a mosaic of shrub and native grasslands in near-historical conditions with naturally functioning riparian systems, while reducing woody plant encroachment of upland vegetation communities. Resultant vegetation communities will begin to approach historical condition and function, enhancing the distribution of native vegetation associations (Meyer 2000). Restoring the historical vegetation and fire regime into the ecosystem of the planning area will maintain a mosaic of vegetation associations with irregular or clumpy appearance and patterns, age structure, and cover types.

The September 18, 2008 Altar Valley Fire Management Plan contains a complete description of the proposed action and is included herein by reference (AVCA 2008). The following is a summary of the FMP parameters that relate to the potential effects, including the prescribed fire season, size, and intensity; monitoring; reporting; and conservation measures to minimize the effects to listed species.

Planning Area

The Altar Valley is an area approximately 52 miles long and 20 miles wide through which the Altar Wash flows out of the Arivaca watershed, Figure 1. Elevation ranges from 2,500 feet (ft) above mean sea level (msl) on the valley floor near SR 86 to 7,730 ft above msl at the top of Baboquivari Peak. Elevation increases relatively rapidly east to west from the valley floor to the tops of the surrounding mountains, and gradually from north to south on the valley floor. The AVFMP planning area is generally bounded on the south by the U.S./Mexico border, on the north by State Route (SR) 86, on the west by the Baboquivari and Coyote mountains, and on the east by the Sierrita, Las Guijas, Cerro Colorado, and San Luis mountains. The planning area encompasses three small towns: Three Points at the SR 86/SR 286 intersection, Arivaca at the extreme southeastern end of the Valley, and Sasabe at the southern end of the Valley, see Figure 2 in the AVFMP. The Buenos Aires National Wildlife Refuge (BANWR) is not part of the planning area, though it is discussed in the AVFMP.

Fire Management Units

The AVFMP was drafted to meet fire management planning requirements of the land management agencies and private landowners through the use of applied geographical information system (GIS) analysis. The AVFMP describes 158 Fire Management Units (FMU) within the planning area that are delineated by livestock allotments or land-use designation (Figure 3 in the AVFMP).

The AVCA developed the Fire Management Unit Map (FMUM) of the Altar Valley watershed, which depicts areas of confinement, containment, or control for wildland fire as well as water tanks, wells, fences, and vegetation transects that may provide access for emergency resource response for wildland fire suppression. In the AVFMP, the FMUs were realigned or reconfigured to meet fire response needs through natural or artificial barriers to wildfire movement. The adjustments to the original FMUs were based on general environmental considerations, such as vegetation association, fuel loading, specific wildlife habitat considerations for species listed under the Act, and wildfire hazard and potential.

The resulting 158 FMUs range in size from 2 to 22,897 acres. Wherever possible, roads and drainage boundaries were used as logical divisions between the FMUs. Each FMU is primarily composed of one of the major vegetation associations present. However, since desert grassland

and mesquite communities are the two most common vegetation associations, usually one or both of these are abundant in other vegetation association classifications.

Wildland Fire Suppression Zones

The AVFMP's planning area describes areas that are not appropriate for any fire, including areas where wildfires are actively suppressed because of public safety concerns within the wildland urban interface of local communities; areas where wildland fire management implementation will occur through existing agreements, such as the BANWR and Coronado National Forest (CNF); and areas where individual ranchers within the planning area will suppress wildland fire. No prescribed burns will occur in these wildland fire suppression zones under the AVFMP, and wildfires will be fully suppressed. Therefore, implementation of the AVFMP will not affect listed species or other resource values within the suppression zones.

Fire Seasons

Fire seasons have been grouped into cool, summer, and monsoon seasons based on the season of occurrence.

Cool season fires occur from October through April. These fires are typically less frequent in occurrence, burn at low intensities, are small in size, and reduce light fuel with minimal effects on existing vegetation components.

Summer season fires occur from May to mid-July. Summer season ignitions are expected to have the greatest potential to carry wildland fire, to burn larger in size, and to be more diverse in intensity than fires in other seasons.

Monsoon season fires occur from mid-July through September during the rainy season. Fires within the monsoon vary in size and intensity according to the relative amounts of live fuel moisture due to vegetation green-up following the onset of the monsoon weather pattern. If the monsoon weather pattern does not occur, or provides only weak precipitation, the monsoon season fires are more likely to be similar in effect to summer season fires.

Fire Size

The Altar Valley consists of 609,900 acres in Pima County, Arizona. The planning area does not contain the 116,542 acres of the BANWR and 84,742 acres of the Coronado National Forest, which are managed under separate fire management plans. In addition, 125,116 acres of privately owned or state trust lands are identified for full suppression and will not be managed for prescribed fire through the AVFMP. The remaining approximately 282,600 acres covered by the AVFMP are privately owned and state trust land and could be subject to prescribed fire.

A threshold of 15 percent of the 282,600 acres (42,390 acres) has been set as an annual maximum burn acreage threshold. This acreage threshold will be calculated as an average across three years to provide flexibility for variable conditions from year to year. Unpredictable wildfires are included in the annual acreage threshold and are outside the control of NRCS. Therefore, the combination of wildland fire and prescribed burns may impact approximately 42,390 acres annually on average with the preceding two years. If the average from the two preceding years and the planned prescribed burn acreage for the third year will exceed the annual acreage threshold, then the acreage will be reduced to stay within the annual acreage threshold.

If a wildfire results in the exceedence of the annual acreage threshold, the prescribed burn acreage will be reduced to stay within the annual acreage threshold. Burn acreage will be calculated based upon the perimeter of the prescribed burn or wildfire and not the actual number of acres burned or "blackened".

Fire Effects and Intensity

The AVFMP also has set thresholds that limit the effects of fire on the particular vegetation associations in the planning area. These fire effect thresholds are intended to ensure that plan objectives are met, while not adversely impacting the watershed. These fire effect thresholds may further reduce the acres that are burned through prescribed burning in the planning area. These fire effect thresholds are based upon the percentage of a vegetation association that is subjected to severe fire effects of both prescribed and wildfires. Severe fire effects are typically indicated by the loss of canopy cover in wooded vegetation associations and will be determined by the AVFMP cooperators. Table 3 of the AVFMP quantifies the maximum fire effect thresholds permitted, based upon percentage of acres, relative to the prescription guidelines and expectations for a particular fire event. These maximum effects threshold levels are not attainment goals or objectives, but are maximum desired outcomes of prescribed fire, taking into account habitat requirements of listed species or desired vegetation structure objectives for a particular FMU.

If a prescribed fire is expected to burn at an intensity level that exceeds the prescription for a FMU or for the fire effect threshold for a particular vegetation association, appropriate measures will be taken to suppress it. Strategies, such as containment, control with direct attack, and control with indirect attack are all acceptable given considerations of firefighter safety and values at risk. The ability to successfully manage wildland fires within prescription will be dictated by several factors such as burning conditions, fire size, management resources, and firefighter safety. An adaptive management process based on the analysis of the final fire results will be used to predict outcomes and suggest management actions for similar wildland fire ignitions, with similar vegetation associations, for the current year and in future prescribed fire planning.

Monitoring, Adaptive Management, and Reporting

The cooperating agencies and landowners will use the monitoring information to track burn acreage, effect thresholds, and the ability of NRCS to meet the goals of the AVFMP. Burned-area mapping may be effectively conducted from the ground for prescribed fire. Fire-effects monitoring as a visual measure of fire impacts will be accomplished by mapping conducted by the burn crew and other cooperators. Generally, fire effects are mapped at 500 to 1,500 ft above ground level on 1:24,000 scale topographic maps when flight time is available from one of the cooperating agencies. An appropriate level of ground-truthing and sampling will occur to determine accuracy of fire-boundary delineations. Long-term vegetation and watershed response will be measured using the current pace frequency transects read by NRCS with the cooperating ranchers on 1 to 3 year intervals, as needed.

Fire occurrence information will be gathered/summarized by NRCS in the fall of each year (Nov/Dec). All participating Ranchers/Agencies will assist with the information gathering and summarizing for an annual report. This report will detail: acres, location, severity of burn, description of burn, any note-worthy comments about burn, etc. Topographic base maps at 1:24,000 scale will be used. Adaptive Management strategies may be developed or suggested

depending on the fire effects on species listed under the Act, and/or their habitats. A collaborative approach to adaptive management (AM) will be used to implement corrective actions when faced with changing ecological, economic, or social conditions. Implementation of AM will involve frequent review and feedback on progress toward reaching project goals while the project is being implemented (USDA 2004a). Effective monitoring is an essential element of AM, because it provides reliable feedback on the effects of project actions.

Fire acreage information will be forwarded by the cooperating agencies to the NRCS by December 31 each year for inclusion in the Annual Monitoring Report. The Annual Fire Monitoring Report will be completed around January 15 of each year.

Conservation Measures

Pima pineapple cactus:

Pima pineapple cactus is a small spherical cactus that is found in Sonoran desert scrub and grassland vegetation communities in the Altar and Santa Cruz River valleys. Suitable Pima pineapple cactus is defined as:

- Those habitats within the action area that are between 2,300 feet (ft) and 4,500 ft (700 to 1,400 meters [m]) in elevation that are in the following vegetation associations:
    - Semi-arid grasslands
    - Desert scrub

Prescribed fire plans developed for areas without suitable Pima pineapple cactus habitat – as described above, will not require conservation measures.

Prescribed fire plans developed for areas that include suitable Pima pineapple cactus habitat will include the following:

- Single pass surveys to locate Pima pineapple cactus will be performed over the suitable Pima pineapple cactus habitat within the boundaries of the proposed burn.
    - Suitable habitat will be determined by elevation and vegetation association. If developed, a Pima pineapple cactus habitat model, similar to the model used by the BANWR, will be used to determine suitable habitat.
    - Surveys are valid for a maximum of six years.

- Individual cacti will be protected from the effects of the prescribed fire.
    - Protection of cacti will be accomplished through the clearing of fuels from around individual cacti from the area between two to three meters from the plant, leaving the vegetation within the two-meter radius immediately surrounding the plant untouched. Alternatively, a fire-proof, cone-like structure may be used to protect each plant.
    - An area with a high density of cacti or a group of cacti may be protected through blacklining a 2-meter area around the cacti.

- Post fire census of the known cacti will be conducted to determine effectiveness of protective measures.

    - Post fire census should occur within 30-60 days after the fire and again within 120 days.

- The acreage of each fire will be reported, as will the location of cacti, protective measures used, and their effectiveness in protecting individual cacti. This information will be used to determine the short-term vs. the long-term effects of the FMP.

Exceptions to these basic conservation measure are possible as part of a quantitative research study of fire within various fuel loads and types on Pima pineapple cactus approved by the FWS. This study should include:

- Single pass surveys to locate individual cacti shall be conducted as part of the study.
- Protective measures will be waived for up to 20 percent of the cacti in the approved study area to determine fire effects on Pima pineapple cactus.
- Prescription parameters, fuel types, fuel loads, fire behavior, and fire severity should be part of the information to determine the fire effects on individual cacti and potentially the population as a whole.
- Post fire surveys will be conducted to determine the fire effects on individual cacti within 30 days of the fire, within six months of the fire, and approximately one year after the fire. This schedule may be modified to fit approved research design.
- The results will be used to evaluate the basic conservation measures listed above. Modifications to the conservation measures will be proposed based upon these results, and modifications to the FMP may be made if applicable, with the approval of the FWS.

Prescribed burns on the Pima pineapple cactus mitigation bank will be consistent with the mitigation bank agreement.

<u>Masked bobwhite:</u>

- If birds are present, burns will be prohibited during the breeding season (April and July through October) in the occupied area.
- Aerial ignition patterns should not have flame fronts ignited closer than ¼ mile apart to allow for escape routes and a more natural, mosaic-burn pattern, with exceptions for firefighter safety, personal property, or other resource protection measures.

<u>Lesser long-nosed bat:</u>

- If a roost is found in the action area, prescribed burns will not include areas where smoke could affect roosts while bats are present.
- Ignition patterns should avoid high severity fire effects in agave patches.

<u>Chiricahua leopard frog:</u>

- Avoid high severity fire effects upstream from any occupied habitat
- If extensive erosion is possible, sediment traps should be placed above occupied habitat to reduce potential take of this species.

Kearney's bluestar:

- No populations of Kearny's bluestar are known to occur in the area subjected to prescribed fire under this plan.
- All suitable habitats for this species in a proposed burn area will be surveyed in late April-May prior to prescribe burning. Suitable habitat is known to be:

    - Dry, open, slopes (20-30 degrees) at 4,000-6,000 ft (1220-1830 m) elevation in Madrean evergreen woodland – interior chaparral ecotone, and
    - Partially-shaded, coarse alluvium along dry washes and adjacent uplands at 3,600 and 3,800 ft (1,095-1,160 m) elevation under deciduous riparian trees and shrubs in Sonoran desert scrub or desertscrub-grassland ecotone.

- Any occupied area will be protected or avoided.

Southwestern willow flycatcher:

- Mesoriparian woodlands are not a common vegetation association in the action area and will not be included in any prescribed burn plans.

Mexican spotted owl:

Areas where prescribed burns are planned to include suitable habitat of the Mexican spotted owl will be surveyed, per established Mexican spotted owl survey protocol (FWS 2003) as amended, to determine occupancy of the habitat within and adjacent to the burn perimeter.

If occupancy can't be demonstrated through surveys, the burn may progress as planned.

If occupancy is demonstrated through surveys, the burn will be implemented:

- Outside the Mexican spotted owl breeding season, which is March 1 through August 31.

If occupancy is demonstrated through surveys and the burn is planned during September 1 through February 28, the burn will be implemented:

- So that the nest cores are left undisturbed, approximately 100 acres around the nest, or
- Fire and fire management activities will remain more than a ¼ mile away from the nest.

STATUS OF THE SPECIES AND CRITICAL HABITAT

CHIRICAHUA LEOPARD FROG

The Chiricahua leopard frog was listed as a threatened species without critical habitat in a Federal Register notice dated June 13, 2002 (67 FR 40790). Included was a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. No critical habitat has been designated for this species.

The Chiricahua leopard frog is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 feet in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, the Sierra Madre Occidental of northern and central Chihuahua, and possibly as far south as northern Durango (Platz and Mecham 1984, Degenhardt *et al.* 1996, Sredl *et al.* 1997, Sredl and Jennings 2005). The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Lithobates lemosespinali*) in the southern part of the range of the Chiricahua leopard frog. In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994-1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). In Arizona, slightly more than half of all known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl *et al.* 1997). Sixty-three percent of populations extant in Arizona from 1993-1996 were found in stock tanks (Sredl and Saylor 1998).

Die-offs of Chiricahua leopard frogs were first noted in former habitats of the Tarahumara frog (*Lithobates tarahumarae*) in Arizona at Sycamore Canyon in the Pajarito Mountains (1974) and Gardner Canyon in the Santa Rita Mountains (1977-78) (Hale and May 1983). From 1983-1987, Clarkson and Rorabaugh (1989) found Chiricahua leopard frogs at only two of 36 Arizona localities that had supported the species in the 1960s and 1970s. Two new populations were reported. During subsequent extensive surveys from 1994-2001, the Chiricahua leopard frog was found at 87 sites in Arizona, including 21 northern localities and 66 southern localities. (Sredl *et al.* 1997, Rosen *et al.* 1996, FWS files). In New Mexico, the species was found at 41 sites from 1994 -1999; 31 of those sites were verified extant during 1998-1999 (Painter 2000). During May-August 2000, the Chiricahua leopard frog was found extant at only eight of 34 sites where the species occurred in New Mexico during 1994-1999 (C. Painter, pers. comm. 2000). Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (C. Painter and R. Jennings, pers. comm. 2004). The species has been extirpated from about 80-85 percent of its historical localities in Arizona and New Mexico. Nineteen and eight localities are known from Sonora and northern and west-central Chihuahua; respectively, however, the status of the species in Mexico is poorly understood.

Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes due to fire suppression and livestock grazing, mining, development, and other human activities; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. Loss of Chiricahua leopard frog populations is part of a pattern of global amphibian decline, suggesting other regional or global causes of decline may be important as well (Carey *et al*. 2001). Witte *et al.* (2008) analyzed risk factors associated with disappearances of ranid frogs in Arizona and found that population loss was more common at higher elevations and in areas where other ranid population disappearances occurred. Disappearances were also more likely where introduced crayfish occur, but were less likely in areas close to a source population of frogs.

Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by nonnative organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Lithobates catesbeianus*), tiger salamanders (*Ambystoma mavortium mavortium*), crayfish (*Orconectes virilis* and possibly others), and several other species of fish (Clarkson and Rorabaugh 1989; Sredl and Howland

1994; Fernandez and Bagnara 1995; Snyder *et al.* 1996; Rosen *et al.* 1996, 1994; Fernandez and Rosen 1996, 1998). For instance, in the Chiricahua region of southeastern Arizona, Rosen *et al.* (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and nonnative predatory fish. Rosen *et al.* (1996) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl *et al.* 1997, Sredl and Howland 1994). Chiricahua leopard frog populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and closer together. If populations winked out due to drought, disease, or other causes, extirpated sites could be recolonized via immigration from nearby populations. However, as numbers of populations declined, populations became more isolated and were less likely to be recolonized if extirpation occurred. Also, most of the larger source populations along major rivers and in cienega complexes have disappeared.

Fire frequency and intensity in Southwestern forests are much altered from historical conditions (Dahms and Geils 1997). Before 1900, surface fires generally occurred at least once per decade in montane forests with a pine component. Beginning about 1870-1900, these frequent ground fires ceased to occur due to intensive livestock grazing that removed fine fuels, followed by effective fire suppression in the mid to late 20th century (Swetnam and Baisan 1996). Absence of ground fires allowed a buildup of woody fuels that precipitated infrequent but intense crown fires (Danzer *et al.* 1997, Swetnam and Baisan 1996). Absence of vegetation and forest litter following intense crown fires exposes soils to surface and rill erosion during storms, often causing high peak flows, sedimentation, and erosion in downstream drainages (DeBano and Neary 1996). Following the 1994 Rattlesnake fire in the Chiricahua Mountains, Arizona, a debris flow filled in Rucker Lake, a historical Chiricahua leopard frog locality. Leopard frogs (either Chiricahua or Ramsey Canyon leopard frogs) apparently disappeared from Miller Canyon in the Huachuca Mountains, Arizona, after a 1977 crown fire in the upper canyon and subsequent erosion and scouring of the canyon during storm events (Tom Beatty, Miller Canyon, pers. comm. 2000). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitat is largely absent now and the only breeding leopard frog populations occur in man-made tanks and ponds. Crown fires followed by scouring floods are a likely cause of this absence of natural leopard frog habitats. Bowers and McLaughlin (1994) list six riparian plant species they believed might have been eliminated from the Huachuca Mountains as a result of floods and debris flow following destructive fires.

An understanding of the dispersal abilities of Chiricahua leopard frogs is key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. As a group, leopard frogs are surprisingly good at dispersal. In Michigan, young northern leopard frogs (*Lithobates pipiens*) commonly move up to 0.5 mile from their place of metamorphosis, and 3 young males established residency up to 8.4 miles from their place of metamorphosis (Dole 1971). Both adults and juveniles wander widely during wet weather (Dole 1971). In the Cypress Hills, southern Alberta, young-of-the year northern leopard frogs successfully dispersed to downstream ponds 3.4 miles from the source pond, upstream 0.6 mile, and overland 0.6 mile. At Cypress Hills, a young-of-the-year northern leopard frog moved 13 miles in one year (Seburn *et al.* 1997). The Rio Grande leopard frog (*Lithobates berlandieri*) in southwestern Arizona has

been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh 2005). After the first rains in the Yucatan Peninsula, leopard frogs have been collected a few miles from water (Campbell 1998). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

Dispersal of leopard frogs away from water in the arid Southwest may occur less commonly than in mesic environments in Alberta, Michigan, or the Yucatan Peninsula during the wet season. However, there is evidence of substantial movements even in Arizona. Movement may occur via movement of frogs or passive movement of tadpoles along streamcourses. The maximum distance moved by a radio-telemetered Chiricahua leopard frog in New Mexico was 2.2 miles in one direction (R. Jennings, C. Painter, pers. comm. 2004). In 1974, Frost and Bagnara (1977) noted passive or active movement of Chiricahua and Plains (*Lithobates blairi*) leopard frogs for 5 miles or more along East Turkey Creek in the Chiricahua Mountains. In August, 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult Chiricahua leopard frogs at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 miles away. Rosen *et al.* (1996) found small numbers of Chiricahua leopard frogs at two locations in Arizona that supported large populations of nonnative predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these animals were populations 1.2-4.3 miles distant. In the Dragoon Mountains, Arizona, Chiricahua leopard frogs breed at Halfmoon Tank, but frogs occasionally turn up at Cochise Spring (0.8 mile down canyon in an ephemeral drainage from Halfmoon Tank) and in Stronghold Canyon (1.1 mile down canyon from Halfmoon Tank). There is no breeding habitat for Chiricahua leopard frogs at Cochise Spring or Stronghold Canyon, thus it appears observations of frogs at these sites represent immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of Chiricahua leopard frogs disappeared from Silver Creek stock tank after the tank dried up; but frogs then began to appear in Cave Creek, which is about 0.6 mile away, again, suggesting immigration. Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn *et al.* 1997). Displaced northern leopard frogs will home, and apparently use olfactory and auditory cues, and possibly celestial orientation, as guides (Dole 1968, 1972). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Recent evidence suggests a chytridiomycete skin fungi, *Batrachochytrium dendrobatidis* (Bd), is responsible for global declines of frogs, toads, and salamanders (Speare and Berger 2000, Longcore *et al.* 1999, Berger *et al.* 1998, Hale 2001). Decline or extinction of about 200 amphibian species worldwide has been linked to the disease (Skerratt *et al.* 2007). The proximal cause of extinctions of two species of Australian gastric brooding frogs and the golden toad (*Bufo periglenes*) in Costa Rica was likely Bd. Another species in Australia for which individuals were diagnosed with the disease may be extinct (Daszak 2000). Although the cause of death is uncertain, a thickening of the skin on the feet, hind legs and ventral pelvic region is thought to interfere with water and gas exchange, leading to death of the host (Nichols *et al.* 2001). In Arizona, Bd infections have been reported from several populations of Chiricahua leopard frogs in southeastern Arizona, as well as populations of other several other frogs and toads (Morell 1999, Sredl and Caldwell 2000, Davidson *et al.* 2000, Hale 2001, Bradley *et al.* 2002, U.S. Fish and Wildlife Service 2007).

In New Mexico, chytridiomycosis was identified in a declining population near Hurley, and patterns of decline at 3 other populations are consistent with chytridiomycosis (R. Jennings, pers. comm. 2000). Die-offs typically occur during the cooler months from October-February.

The role of the fungi in the population dynamics of the Chiricahua leopard frog is as yet undefined. Some populations go to extinction once animals become symptomatic; however, other Chiricahua leopard frog populations can exist with the disease for extended periods (U.S. Fish and Wildlife Service 2007). For instance, the frog has coexisted with Bd in Sycamore Canyon, Arizona since at least 1972. However, even in the best of cases, it is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction. Because of the interchange of individuals among subpopulations, metapopulations of frogs may be particularly susceptible. Rapid death of all or most frogs in stock tank populations in a metapopulation of Chiricahua leopard frogs in Grant County, New Mexico was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora. However in both cases, symptoms of moribund frogs matched those of chytridiomycosis. The disease has now been documented to have been associated with Tarahumara frog die-offs since 1974 (Hale 2001). The earliest record for Bd in Arizona (Sycamore Canyon west of Nogales, 1972) roughly corresponds to the first observed mass die-offs of ranid frogs in Arizona.

Recently, retrospective analysis revealed presence of chytridiomycosis in African clawed frogs (*Xenopus laevis*) dating to 1938 (Weldon *et al.* 2004). Further evidence showed the disease was a stable endemic in southern Africa for at least 23 years before any Bd-positive amphibian specimen was found outside of Africa. African clawed frogs were exported from Africa for use in human pregnancy testing beginning in the 1930s. Weldon *et al.* (2004) suggest that Africa is the origin of the disease and that international trade in African clawed frogs was the means of disease dissemination. Once introduced to the Southwest via escaped or released clawed frogs, the disease may have spread across the landscape by human introductions or natural movements of secondarily-infected American bullfrogs, tiger salamanders, leopard frogs.

Free-ranging healthy bullfrogs with low-level chytriodiomycosis infections have been found in southern Arizona (Bradley *et al.* 2002). Tiger salamanders and bullfrogs can carry the disease without exhibiting clinically significant or lethal infections. When these animals move, or are moved by people, among aquatic sites, Bd may be carried with them (Collins *et al.* 2003). Other native or nonnative frogs may serve as disease vectors or reservoirs of infection, as well (Bradley *et al.* 2002). Bd could also be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. The FWS and Arizona Game and Fish Department are employing preventative measures to ensure the disease is not spread by aquatic sampling.

In captivity, frogs can be cleared of chytridomycosis with the antifungal agents miconazole and itraconazole (Nichols and Lamirande 2003), but no methods currently exist to clear the disease from a habitat site and subsequently keep it free of disease. Based on observations over a number of years at Ramsey Canyon leopard frog and Tarahumara frog localities, there is some indication that the disease may not be able to persist in the environment for long without a suitable host. The disease organism also requires water or moist sites; however, a recent attempt to eliminate the disease from a Ramsey Canyon leopard frog site by drying it out failed. High

temperatures during the summer may slow reproduction of Bd to a point at which the organism cannot cause disease (Bradley *et al.* 2002). Rollins-Smith *et al.* (2002) also showed that Bd spores are sensitive to antimicrobial peptides produced in ranid frog skin. The effectiveness of these peptides is temperature dependent and other environmental factors probably affect their production and release (Matutte *et al.* 2000). Harris (*et al.* 2006) found that several species of bacteria on the skin of amphibians inhibit the growth of *Batrachochytrium dendrobatidis*. The authors suggested that inoculating susceptible species could potentially provide them with some resistance to the disease. There is additional evidence that frogs may develop resistance to the pathogen or the pathogen may have developed less virulent strains that do not drive the host species to extinction (Retallic *et al.* 2004). Mendelson III *et al.* (2006) suggest that natural agent control (such as anti-microbial peptides or cutaneous bacteria) or selecting for disease resistance may be possible as recovery strategies for some amphibians currently at risk due to the disease.

A recovery plan has been completed (U.S. Fish and Wildlife Service 2007), the goal of which is to improve the status of the species to the point that it no longer needs the protection of the Endangered Species Act. The recovery strategy calls for reducing threats to existing populations; maintaining, restoring, and creating habitat that will be managed in the long term; translocating frogs to establish, reestablish, or augment populations; building support for the recovery effort through outreach and education; monitoring; research needed to provide effective conservation and recovery; and application of research and monitoring through adaptive management. Recovery actions are recommended in each of eight recovery units throughout the range of the species. Management areas are also identified within recovery units where the potential for successful recovery actions is greatest.

Additional information about the Chiricahua leopard frog can be found in Painter (2000), Sredl *et al.* (1997), Jennings (1995), Degenhardt *et al.* (1996), Rosen *et al.* (1996, 1994), Sredl and Howland (1994), Platz and Mecham (1984, 1979), Sredl and Jennings (2005), and U.S. Fish and Wildlife Service (2007).

PIMA PINEAPPLE CACTUS

The final rule listing Pima pineapple cactus as endangered was published on September 23, 1993 (58 FR 49875). No critical habitat has been designated. Pima pineapple cactus occurs south of Tucson, in Pima and Santa Cruz counties, Arizona and adjacent northern Sonora, Mexico. Pima pineapple cactus is distributed at very low densities throughout both the Altar and Santa Cruz valleys, and in low-lying areas connecting the two valleys. Factors that contributed to the listing include habitat loss and degradation, habitat modification and fragmentation, limited geographic distribution and 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.

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 affecting 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.

Extrapolations from 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 estimate 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. Field observations suggest that a great deal of land area within the range boundaries would not support Pima pineapple cactus today due to historical 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, and dispersal mechanisms.

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, burroweed, and desert zinnia), and 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 1-3 plants per acre. Other densities across the majority of the plant's range vary between one plant per 4.6 acres and one plant per 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. As stated above, analysis of surveys conducted from 1992 to 1995 with a multivariate statistical analysis documented a pattern of greater population densities, higher ranks of cactus vigor, and better reproduction occurring within the transition vegetation association 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.

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 2,360 ft. and 4,700 ft. (Phillips *et al.* 1981, Benson 1982, Ecosphere 1992), in vegetation characterized as either or as combination of the Arizona upland of the Sonoran Desert scrub and semidesert grasslands (Brown 1982).

Densities range between 0.05-3 plants per acre. Pima pineapple cactus is known to occur 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 impacts. To date, an estimated 56,730 acres, or 10 to 20 percent of the U.S. range, have 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 approximately 4,000 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 approximately 4,000 individuals recorded to date, 2,212 (55 percent) of them have been removed. This number includes observed and authorized mortalities and individuals transplanted since the species was listed in 1993. A small portion of these mortalities was caused by natural factors (e.g., drought). Moreover, this figure does not take into account those cacti that are removed from private land or lost to other projects that have not undergone section 7 reviews.

The area of habitat reviewed under section 7 of the ESA between 1987 and 2000 (i.e., habitat developed or significantly modified beyond the point where restoration would be a likely alternative) is approximately 24,429 acres, which represents 43 percent of the total area surveyed to date. In 1998, more than 1,100 acres of Pima pineapple cactus habitat were lost including 752 acres from the ASARCO, Inc. Mission complex project. In 2000, 586 acres of habitat were lost with the expansion of a state prison in Tucson. In 2001, 177 acres of habitat were lost through development, but 888 acres of occupied and suitable habitat were conserved through conservation easements. In 2002-2003, 76.5 acres of occupied habitat were destroyed, but 36 acre-credits were purchased in the Pima pineapple cactus conservation bank, thus protecting 36 acres of Pima pineapple cactus habitat; and an additional 58.5 acres of Pima pineapple cactus habitat were conserved in a conservation easement. We are aware of housing developments along Valencia Road, Pima County, Arizona, in the vicinity of T15S, R12E, Section 15 and surrounding areas, which 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, we believe it is significant.

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 plant's range or in scattered parcels. The largest contiguous piece of federally owned land is the BANWR, located at the southwestern edge of the plant's range at higher elevations and with lower plant densities.

The Arizona Native Plant Law may delay vegetation clearing on private property for the salvage of specific plant species within a 30-day period. Although the Arizona Native Plant Law prohibits 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. Transplanted individuals are not considered as functioning within the context of a self-sustaining population. Efforts to transplant individual cacti to other locations have had only 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. We view transplanting cacti as a measure of last resort for conserving the species. Transplanting will be recommended only when on-site and off-site habitat conservation is not possible and the death of cacti is unavoidable.

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

Other specific threats that have been previously documented (U.S. Fish and Wildlife Service 1993), such as overgrazing and mining, have not yet been analyzed to determine the extent of effects to this species. However, partial information exists. Mining has resulted in the loss of hundreds, if not thousands, of acres of potential habitat throughout the range of the plant. Much of the mining activity has been occurring in the Green Valley area, which is the center of the plant's 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 (U.S. Fish and Wildlife Service 1993).

In summary, monitoring has shown that the range-wide status of the Pima pineapple cactus appears to have been recently affected by threats that have completely altered or considerably modified more than a third of the species' surveyed habitat, and have caused the elimination of nearly 60 percent of documented locations. 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 habitat. Habitat fragmentation and degradation will likely continue into the foreseeable future based on historical data and growth projections produced by the Pima County Association of Governments (1996). There is very little Federal oversight on conservation measures that would protect or recover the majority of the potential habitat. Even some areas where section 7 consultations have been completed have been modified and may not be able to support viable populations of the Pima pineapple cactus over the long-term.

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.

Description of the Action Area

The action area covers the planning area of the AVFMP as discussed above. The BANWR is also considered part of the action area as it is downstream from much of the private and state trust lands included in the AVFM and will be affected by run off from areas treated under the AVFMP. The post fire effects on species located on the BANWR are discussed below.

A. Status of the species and critical habitat within the action area

CHIRICAHUA LEOPARD FROG

Chiricahua leopard frogs in the action area are only known from isolated ponds and livestock tanks on the BANWR. A series of three ponds or enclosures and 14 livestock tanks, six of which are perennial, make up one of the most secure metapopulations of this species. These population sites have been secured due to active removal of bullfrogs as part of a research effort by U.S. Geological Survey and the University of Arizona. Currently, dispersing bullfrogs from neighboring lands have been managed successfully, but removal of the source populations of bullfrogs is needed to fully secure Chiricahua leopard frog populations from this threat. Drought has further resulted in the loss of several population sites, including the one site on Arizona State Trust Lands and several tanks on the BANWR. Reestablishment and augmentation of Chiricahua leopard frog populations on the BANWR has occurred in an effort to maintain this metapopulation. In addition, water was hauled to State Tank in 2007 through the combined efforts of the BANWR fire crew, Arizona Game and Fish Department through Tucson Electric Power, and U.S. Department of Homeland Security through the U.S. Border Patrol.

Two of the neighboring landowners are working to establish Chiricahua leopard frogs on their properties through the Arizona Game and Fish Department's Chiricahua Leopard Frog Safe Harbor Agreement. One has built a captive rearing facility and the other has refurbished two livestock tanks, and once the bullfrog exclosure is completed, Chiricahua leopard frogs will be reestablished into one of the livestock tanks. Reestablishment of Chiricahua leopard frogs on both properties is expected in spring of 2009.

PIMA PINEAPPLE CACTUS

The majority of the valley bottom in the action area consists of Sonoran desert scrub and semi-desert grasslands communities that are potential habitat for this species. Individuals are scattered throughout the valley with some areas of relatively high densities. The BANWR has used the 484 locations it has found in its inventory and monitoring program for Pima pineapple cactus to develop and validate a model of Pima pineapple cactus habitat suitability. This model has been shown to be approximately 88 percent accurate in identifying suitable habitat, but the model is limited in scope to the BANWR.

A private mitigation bank for Pima pineapple cactus is located in the action area. While the bank contains approximately 1,300 acres, conservation easements are recorded on the bank in a phased approach, based upon demand for mitigation credits. Currently, the bank has 200 acres in conservation.

B. Factors affecting species environment and critical habitat within the action area

CHIRICAHUA LEOPARD FROG

Chiricahua leopard frogs within the action area have been under heavy management to reduce the impacts of bullfrogs dispersing into occupied sites from lands adjacent to the BANWR. This management has involved repeated monitoring and removal of individual bullfrogs from the Chiricahua population sites.

The drought conditions of the past several years are continuing in the action area and threaten population sites as temperatures rise in late spring and summer each year, resulting in the need to haul water or salvage individuals from drying sites.

The BANWR has an ongoing fire management plan, and wildland fires occur occasionally in the action area. The fire effects described in the Chiricahua leopard frog recovery plan are not seen in the action area (U.S. Fish and Wildlife Service 2007) due to the absence of perennial streams and other potential lotic habitats in the action area. The majority of the fuels on the BANWR are fine grasses and not trees, which reduces both the ash and debris that may be washed into the livestock tanks. Also, the occupied livestock tanks are far from the mountains where most of the large wildland fires have occurred, and ash and debris flows typically have not reached the occupied sites or have been collected in sediment traps or double tanks.

The effects of increased illegal immigration and Border Patrol activities likely have little impact on the Chiricahua leopard frog populations in the action area, because the livestock tanks in which they occur are relatively large and the potential for effects from immigrants drinking or walking in the water are insignificant. The use of these ponds for bathing and personal hygiene may result in some decrease in water quality, but effects of this type have not been studied or documented. The construction and placement of the pedestrian fence along the border may have further reduced these effects from illegal immigration and border enforcement.

Prior section 7 consultations with Federal agencies have influenced the environmental baseline within and in close proximity to the action area. There have been 41 formal consultations involving Chiricahua leopard frogs since its listing in 2002, six of which involved projects in the action area, see document library on the Arizona Ecological Services Office website: http://www.fws.gov/southwest/es/arizona/reading.htm. These consultations included livestock grazing, fire management planning, safe harbor agreements, land and resource management plans, habitat renovation, and water quality standards. The consultations involving fire management each included measures to reduce adverse effects and minimize take of Chiricahua leopard frogs and resulted in non-jeopardy determinations.

PIMA PINEAPPLE CACTUS

Inside the 609,900-acre planning area, only a fraction of the area has been surveyed for Pima pineapple cactus. The BANWR has an active Pima pineapple cactus inventory and monitoring program associated with their fire management plan with approximately 484 locations documented, which includes over 130 locations on neighboring land they surveyed as part of prescribed fires implemented with a private landowner. In 2007, locations of 195 Pima pineapple cactus on the BANWR were visited to assess viability; 75 of the 195 (38.5 percent) checked were still alive (Dan Cohan, pers. comm. 2008).

Wildland fires generally occur in the Altar Valley as a result of natural ignition and human causes – primarily associated with the Highway 286 and fires started by illegal immigrates to either stay warm or signal for help. On the BANWR, these sources of ignition have resulted in approximately 215,600 acres burned in the past 10 years.

The full impact of drought and climate change on PPC has yet to be studied, but it is likely that, if recruitment occurs in punctuated events based on precipitation and temperature (Baker 2006), PPC will be negatively affected by these forces.

The effects of increased illegal immigration and Border Patrol activities likely have a relatively small effect on Pima pineapple cactus in the action area, mainly due to the scattered distribution in the area and the isolated nature of individual plants. These effects most likely result in the loss of individual plants from disturbance along new trails and roads used by illegal immigrants and Border Patrol. These disturbances also result in temporary habitat disturbances that may be reversed after the border is secure or there are no motivations to illegally cross the boarder. The new border infrastructure for a series of remote sensing towers to aid in border security will result in the permanent loss of 10.84 acres of suitable Pima pineapple cactus habitat, and another 22.67 acres will be temporarily impacted during construction. Less than 4 acres of combined permanent and temporary loss of suitable Pima pineapple cactus habitat will occur within the action area (U.S. Fish and Wildlife 2008).

Prior section 7 consultations with Federal agencies have influenced the environmental baseline within and in close proximity to the action area. There have been 44 formal consultations involving Pima pineapple cactus since its listing in 1997, 16 of which occurred in the action area, see document library on the Arizona Ecological Services Office website: http://www.fws.gov/southwest/es/arizona/reading.htm. These consultations included livestock grazing, fire management planning, land and resource management plans, residential development, and transportation projects. The consultations involving fire management within the action area all included measures to reduce adverse effects and resulted in non-jeopardy determinations.

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.

Direct effects of prescribed fires on Chiricahua leopard frog populations are not anticipated under the AVFMP. The frog population sites are currently located on the BANWR and not within the area where prescribed burns will be ignited under the AVFMP. However, Chiricahua leopard frogs could be affected if they are dispersing through grassland vegetation communities during a fire or if fire escapes into occupied riparian or wetland communities. These effects could include mortality and injury from flames, heat, and fire management activities, including mortality by vehicles. The likelihood of these effects is low, as the frogs disperse primarily during humid or wet periods when prescribed fires are not likely to be set, spread, or escape.

Indirect, post-fire effects on Chiricahua leopard frogs are more likely to occur through short-term watershed degradation caused by increases in run-off carrying sediment, debris, and ash downstream into occupied habitats. Fire can lead to elevated soil particle transport due to short-term loss of soil-shielding vegetation and natural litter. Until re-growth occurs, the sediment and ash resulting from fuel combustion may be washed downstream in post storm run-off. The actual volume of erosion and resultant potential silt and ash discharge into drainages is highly variable, depending almost entirely on the intensity and duration of precipitation events.

Studies have shown that large, post-fire hydrologic events can kill fish and frogs and extirpate local populations (Novak and White 1990; Propst *et al.* 1992; Bozek and Young 1994; Rinne 1975, 1996; Rieman *et al.* 1997, Wallace 2003).

Accelerated runoff from upland areas can contribute to bank erosion in stream channels and siltation of riparian and aquatic plants. Accelerated soil erosion also leads to increased sediment-loading in streams. Post-fire erosional processes that deliver sediment to streams over long periods of time due to roads, fire lines, or the lack of re-vegetation can have long-term negative effects on aquatic ecosystems (Lotspeich *et al.* 1970; DeByle and Packer 1972).

Fires generate ash, and incomplete combustion of materials creates charcoal. Elevated peak flow volumes and velocities are associated with increased transport of ash and nutrients (Ffolliott *et al.* 2004). Heavy ash and soot loads in water clog the gills of fish, and presumably tadpoles, and lead to acute and chronic chemical effects, including death. The runoff of ash contributes phosphoric nutrients to aquatic ecosystems, and the presence of charcoal in water is associated with reduced dissolved oxygen concentrations. Both ammonia and phosphorus levels have been documented to be above lethal limits to fish during fires (Spencer and Hauer 1991). Changes in the pH and dissolved oxygen can render habitat unsuitable for fish and amphibian larvae. As nutrient-filled ash flows into streams, it changes the pH and nutrient level of the water (Karle 2000).

The potential increase in sediment, combined with ash and debris could result in mortality and injury from physical trauma with debris, covering of respiratory surfaces of gills, and burying of individuals. These effects could occur to all life history stages of Chiricahua leopard frogs dispersing in drainages. Many adult Chiricahua leopard frogs would likely avoid these effects by leaving the water and waiting until the debris and ash flows pass, although the forage base of these species, mainly aquatic invertebrates, may be reduced temporarily affecting the adults of these species.

The Chiricahua leopard frog recovery plan identifies restoring natural fire regimes as a recovery action (USFWS 2007). The recovery plan recommends a “rule of thumb” that no more than 20 percent of an occupied watershed should be burned at any one time in any three-year period. The watersheds referred to in the Recovery Plan are based upon 10-digit hydrological units (HUs), which are subunits of the larger river drainage basins. In the action area, there are 13 HUs in the Santa Cruz River, Rio Sonora, Rio Asuncion, and Rio Sonoyta basins. The AVFMP proposes a 15 percent average annual maximum burn area, based upon a 3-year average, regardless of specified watersheds. This maximum acreage threshold could result in average maximum annual burns of approximately 42,525 acres which exceeds the “rule of thumb” in the recovery plan.

The effects related to the higher acreage that may be burned annually, based upon a 3-year average, within the watershed are not expected to result in significantly higher effects than described in the Chiricahua leopard frog recovery plan. The 20 percent of a HU “rule of thumb” is based more on the impacts to lotic aquatic systems in or downstream from woodland or forest vegetation associations. The primary vegetation association in the action area is grassland, which produces less ash and debris than forest and woodland associations. The Chiricahua leopard frog breeding sites in the action area are in former livestock tanks and not lotic sites. These population sites are also located several miles downstream from private land or state trust lands covered by the AVFMP, allowing for the dissipation of energy and loss of sediment, ash and debris load in the run off. If high flows containing ash, sediment and debris do travel down

to these breeding sites, the potential effects on the population sites will be further reduced by the sediment traps and the location of these livestock tanks above the bottom of the drainages, allowing most of the ash, sediment and debris to flow past the sites.
In addition, prescribed burns and wildfires are unlikely to cover this amount of acreage in the Altar Valley for a number of reasons, including fire management and safety; the mosaic of vegetation communities; implementation of the conservation measures; and, from an agricultural operator's economic stand point, the grazing deferment needed before a successful fire and the temporary loss of forage post fire. Most prescribed fires are expected to be in the range of a few hundred to several thousand acres. Since the 42,525-acre annual burn cap includes wildland fire, it is reasonable to expect typical annual prescribed burn acreage to be between 10,000 and 20,000 acres on the privately owned and state trust lands in the action area.

Amphibian chytrid may also be spread through mud on hand tools and heavy equipment, especially water tenders or helicopter buckets used to control fires. Amphibian chytrid has resulted in the loss of a number of population sites throughout Arizona and New Mexico. The effects of chytrid on leopard frog populations are discussed in the Chiricahua Leopard Frog Recovery Plan (USFWS 2007). The spread of amphibian chytrid can be reduced by simple cleaning and drying of equipment and vehicles prior to and after its use. It is common for water used to control fires from livestock tanks to be replaced post-fire. If replacement water is from another surface water source, it can spread Amphibian chytrid to the receiving livestock tank. The likelihood of this spread may be reduced through cleaning and drying of water transport tanks and using water from wells or treated water supplies.

Implementation of the AVFMP is most likely to result in direct effects to Pima pineapple cactus. Prescribed fire, like wildland fire, can result in mortality and morbidity of individuals exposed directly to flame or indirectly from heat. The conservation measures will reduce these direct effects by providing a buffer between known Pima pineapple cacti and the fire and reducing fuels around individuals to reduce flame intensities. However, due to the difficulty in locating individuals, it is assumed that some individuals will be exposed to the direct effects of fire. In the case of experimental burns, buffer zones will not be implemented for up to 20% of the Pima pineapple cacti in the study area. This experimental protocol would result in exposing more individuals to direct fire than under the full implementation of the conservation measures, and could result in 20% more mortality and morbidity of individuals within a burn area than with the protective measures. This experimental protocol shall only be done with prior approval of our office and as part of a quantitative research into the fire ecology of this species to assist in species recovery.

If an aerial ignition system is used there is a possibility of a Pima pineapple cactus being ignited by a direct hit or a hit within the buffer zone by an incendiary "ping-pong ball." The likelihood of this source of effects is proportionate to the number of fires ignited by aerial ignition, the density of Pima pineapple cactus within prescribed burn perimeters, and the number of individual "ping-pong balls" used within the prescribed fire boundary, across the years covered by the plan. The number of cacti this ignition source is likely to affect is small.

Indirect effects of the proposed action can result in impacts to habitat from localized accelerated erosion post fire. These effects are particularly likely in areas of high severity fires where short-term loss of soil-shielding vegetation and natural litter has occurred. Until re-growth occurs, soils would be exposed and susceptible to higher rates of erosion than prior to the fire. Accelerated erosion may result in destabilizing suitable habitat and the down stream physical effects on individual cactus. These effects could result in burying individuals, eroding soils

around individuals resulting in pedestaled Pima pineapple cactus that may be susceptible to increased drying of roots and death from toppling over. The actual amount of erosion is highly variable, depending almost entirely on the intensity and duration of precipitation events. In grassland vegetation association, regrowth of grass from root crowns is relatively fast and reduces the potential for erosion related effects.

Prescribed fires include the use of hand tools and heavy equipment to prepare fire lines and contain burns after ignition. These activities may occur before the burn is ignited, during the burn, and as part of the post burn "mop up". Hand tools are not likely to have direct impacts to Pima pineapple cactus, but may be a source of non-native invasive plants that may outcompete or alter the ecosystem. Heavy equipment can also be a source of invasive species, but may have a direct effect on Pima pineapple cactus of mechanically injuring or killing individuals that are run over.

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 BO. 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.

Illegal border activity in the action area has been reduced in the valley due to the construction of the pedestrian barrier along the international border, but activities in the mountains has continued and possibly increased as more traffic is pushed around the pedestrian barrier. These border protection activities have lead to a reduction in the use of the illegal trail system through the valley, and natural revegetation has begun on these trails. The reduction in illegal border activity will likely also result in a reduction in human-caused fires in the valley bottom from unattended warming and signal fires.

However, the impacts of illegal immigration are likely to be shifted into the mountain ranges surrounding the action area. Impacts of Department of Homeland Security will also shift into the mountains.

In addition, the corridor along SR 86 from Tucson, AZ to Three-points, AZ is being developed at an increased rate, in particular at the north end of the Altar Valley. This area is likely to be under increased pressure for urban developments in the near future. Pima County has been purchasing private lands and conservation leases in this area to preserve open space and wildlife corridors as part of the Sonoran Desert Conservation Plan.

Other activities in the Altar Valley include on-going grazing, outdoor recreational activities, and Arizona Department of Transportation maintenance activities along SR 286.

CONCLUSION

After reviewing the current status of Chiricahua leopard frog and Pima pineapple cactus, the environmental baseline for the action area, the effects of the proposed AVFMP, and the cumulative effects, it is the FWS's biological opinion that the AVFMP, as proposed, is not likely to jeopardize the continued existence of the Chiricahua leopard frog or Pima pineapple cactus. No critical habitat has been designated for these species; therefore, none will be affected. In making these determinations, we considered the following:

Chiricahua leopard frog

- The Chiricahua leopard frogs within the action area are not likely to be impacted by direct exposure to fire from this action.
- The Chiricahua leopard frogs are located in dispersed and isolated locations and the impacts of a single fire season are not likely to impact more than one population site.
- The Chiricahua leopard frogs within the action area are located in ponds and former livestock tanks; they are not located in perennial streams where the adverse affects of fire are more likely to occur.
- The loss of frogs from the implementation of the AVFMP is expected to be relatively small and should be offset through the high reproductive potential of this species.
- The long-term effects of the AVFMP should result in an improved grassland cover, reduced surface run-off and sediment load in the run-off water, and improved water retention in the action area; resulting in less sediment deposition in aquatic habitats.

Pima pineapple cactus

- Surveys for Pima pineapple cactus will be conducted prior to implementation of a burn.
- All known Pima pineapple cacti within the boundary of a burn will be protected through the removal of fuels around the cactus or the use of protective fire-proof cones, as described in the conservation measures.
- Research into the fire ecology of Pima pineapple cactus, as approved by FWS, will be limited to 20% of the individuals in the study area.
- The long-term effects of the Altar Valley FMP will be to maintain the native vegetation associations, including desert scrub and grasslands, in the action area.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations 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 (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal 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.

The measures described below are non-discretionary, and must be undertaken by the NRCS so that they become binding conditions of any grant or permit issued to the AVCA, as appropriate, for the exemption in section 7(o)(2) to apply. The NRCS has a continuing duty to regulate the activity covered by this incidental take statement. If the NRCS (1) fails to assume and implement the terms and conditions or (2) fails to require the AVCA to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the NRCS must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR § 402.14(i)(3)].

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.

AMOUNT OR EXTENT OF TAKE

The FWS anticipates incidental take of Chiricahua leopard frog will be difficult to detect for the following reason(s):

- this species has a small body size for most of their life history (eggs, tadpoles, and metamorphs),
- losses may be masked by seasonal fluctuations in numbers or other causes (e.g., cannibalism),
- the species occurs in habitats that make detection difficult, and
- run-off events that could result in incidental take are likely to carry off or bury any dead or injured individuals.

Current erosion in the action area results in sediment being transported into aquatic sites throughout the action area, and ash and debris may be transported downstream into aquatic sites throughout the action area after wildland and prescribed fire events. Incidental take of these species resulting from the implementation of the AVFMP will be difficult to differentiate from these other sources of mortality; therefore, incidental take from the AVFMP will be measured indirectly based upon the direct relation between the area impacted and the amount of sediment, ash, debris, and water that would be transported in run-off events.

Incidental take of Chiricahua leopard frogs in the form of harm and mortality is anticipated from spread of amphibian chytrid, sediment, ash, debris flows, and increased post burn run-off or other surface-disturbing activities related to implementation of the AVFMP. Due to the type, location, and intensity of effects, the response of Chiricahua leopard frogs to these effects, and the location of the breeding sites within the action area, we do not expect the level of incidental take to result in the loss of this metapopulation that is centered on the BANWR. The level of incidental take anticipated is unlikely to result in extirpation of the two permanent population sites on the west side of the valley, but it may impact the proposed reestablishment site on the Sierra Vista Ranch and new sites as they become colonized or reestablished under the Statewide Safe Harbor Agreement. However, the loss of any new sites would not decrease the status of this metapopulation; therefore, the effects of this incidental take should not result in reducing

long-term recovery and conservation potential within the action area from implementation of the AVFMP provided that:

- Not more than fifteen percent (15%) of the ground surface area of the private lands and the State trust lands in the action area shall be burned annually, as a result of the combined total acreage of all prescribed burns undertaken in accordance with the AVFMP together and all wildfires occurring in the action area, based upon a three year average (based upon total acreage within the burn perimeter); and

- Fire effect thresholds or limits, as shown in Table 3 in the AVFMP, for vegetation associations are not exceeded based upon the annual acreage burned in prescribed and wildland fires within the action area.

Because of the difficulty in detecting individuals and the relation of the acres impacted (in terms of extent and intensity) to the likelihood of take occurring, take will be measured indirectly by acres of disturbance, in accordance with the acreage caps identified above. Incidental take shall be exceeded if prescribed burns are implemented in excess of the average annual 15% burn cap or in excess of the fire effect thresholds in Table 3 of the AVFMP.

EFFECT OF THE TAKE

In this biological opinion, the FWS determines that this level of anticipated take is not likely to result in jeopardy to the species for the reasons stated in the Conclusions section.

REASONABLE AND PRUDENT MEASURES and TERMS AND CONDITIONS

The following reasonable and prudent measure(s) are necessary and appropriate to minimize take of Chiricahua leopard frog:

1. The NRCS shall monitor incidental take resulting from the proposed action and report to the FWS the findings of that monitoring.

2. The NRCS shall implement such protections in implementation of the AVFMP to ensure that watershed condition improves to meet the objectives of the AVFMP and reduce potential long-term adverse effects of the AVFMP.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the NRCS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions implement reasonable and prudent measure #1 for Chiricahua leopard frog:

1.1 The NRCS shall monitor the project area and other areas that could be affected by the proposed action to ascertain take of individuals of the species and/or loss of its habitat that causes harm to the species. This monitoring will be accomplished using the following protocol:

a. Maintain a database of fire locations, both prescribed and wildfires. This database may be maintained through the use of Geographic Information System software.
b. Maintain a summary of acreages burned, acres of each vegetation association burned, and the acres within each vegetation association that is subjected to high fire effects.

1.2 The NRCS shall submit annual monitoring reports to the Arizona Ecological Services Field Office by January 15 beginning in 2010. These reports shall briefly document for the previous calendar year the effectiveness of the terms and conditions and locations of listed species observed, and, if any are found dead, suspected cause of mortality. The report shall also summarize tasks accomplished under the proposed minimization measures and terms and conditions. The report shall also document the total number of acres burned, acres of each vegetation association burned, the acres of each vegetation association subjected to high fire effects, and the three year averages. The report shall make recommendations for modifying or refining these terms and conditions to enhance listed species protection or reduce needless hardship on the NRCS and its permittees.

The following term and condition implement reasonable and prudent measure #2 for Chiricahua leopard frog:

2.1 The NRCS shall set a minimum prescribed fire return frequency of no less than four years, based upon prior prescribed fires and wildfires. This minimum return frequency will ensure long-term plant health, ground cover, and watershed health, and it will reduce potential long-term adverse effects to Chiricahua leopard frogs.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. NRCS must immediately provide an explanation of the causes of the taking and review with the AESO the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph 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 effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that NRCS, with the AVFMP cooperator, assist in promoting and supporting, subject to available funds, research opportunities into the fire ecology of the Pima pineapple cactus.

2. We recommend that NRCS work with Arizona Game and Fish Department, through their Statewide Safe Harbor Agreement for Chiricahua Leopard Frogs, to inform landowners of recovery opportunities for the Chiricahua leopard frog.

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

REINITIATION NOTICE

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

The FWS appreciates the NRCS efforts to identify and minimize effects to listed species from this project. For further information please contact Marty Tuegel, (520) 670-6150 (x232) or Sherry Barrett, (x223). Please refer to the consultation number, 22410-F-2005-0002 in future correspondence concerning this project.

Sincerely,

/ s / Sherry Barrett for
Steven L. Spangle
Field Supervisor

cc: Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ

Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ (Attn: Joan Scott)
District Conservationist, Natural Resources Conservation Service, Tucson, AZ
(Attn: Kristen Egen)
State Biologist, Natural Resources Conservation Service, Phoenix, AZ (Attn: Stu Tuttle)

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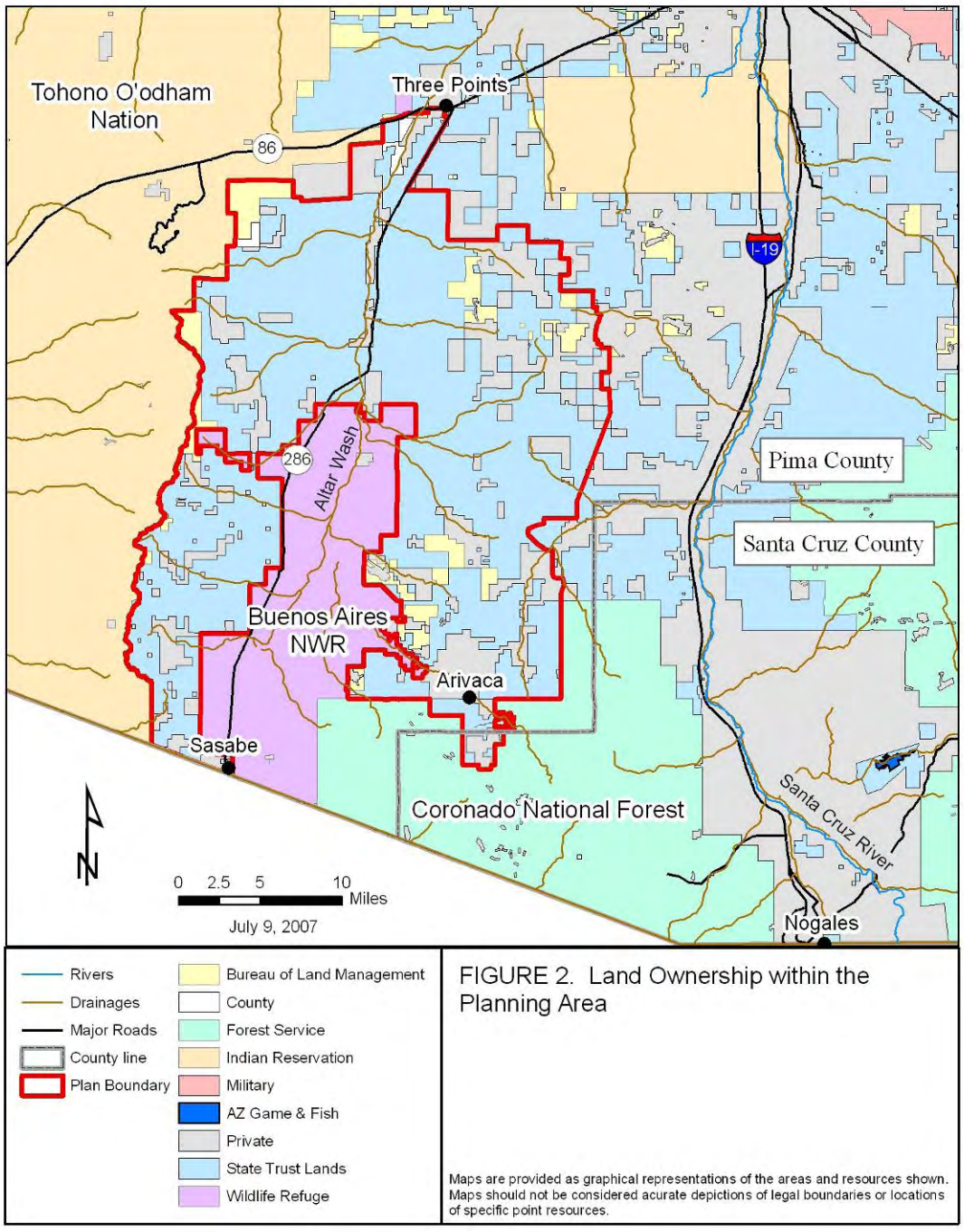
Figure 1. Area included within the Altar Valley Fire Management Plan (Figure 2 from the fire management plan).



Appendix A: Concurrences

This Appendix contains all concurrences with "may affect, not likely to adversely affect" determinations.

Jaguar (*Panthera onca*)

The non-U.S. population was listed as endangered in March 1972 (37 FR 6476). The geographic extent of the listing was expanded to include jaguars in the U.S. on July 22, 1997 (62 FR 39147). It is the largest species of cat native to the Western Hemisphere. Individuals in Arizona have been found in Sonoran desertscrub up through subalpine conifer forest. The loss and modification of habitat, shooting, and predator control have contributed to its decline.

Conclusion

We concur that the proposed action may affect, but is not likely to adversely affect the jaguar, based upon the following:

- Impacts to jaguar habitat from fire management are expected to be relatively small compared to the home range of a jaguar given its mobility and its ability to cover large areas in its normal activities.
- The proposed action avoids fires in riparian areas, which likely serve as movement corridors for the jaguar. The canopy cover will not be removed through the proposed action, and the prescribed fire should have little effect on the use of these areas by jaguars.
- The proposed action does not involve habitat type conversion or the fragmentation or blocking of movement corridors that jaguars may use between Mexico and the United States.
- The prey base for the jaguar (white-tail and mule deer) may be enhanced, in the short term, by the prescribed fire. Long-term changes in vegetation structure may also enhance the prey base.

Kearney's Blue Star (*Amsonia kearneyana*)

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. Plants grow in stable, partially shaded, coarse alluvium along dry washes at 1,097 - 1,158 m (3,600-3,800 ft) elevation. 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.

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 FWS concurs that the proposed action may affect, but is not likely to adversely affect Kearney's bluestar, based upon the following:

- The known location of these plants is easily avoided.
- Conservation measures will be implemented to avoid adverse effects.
- No critical habitat has been designated for this species.

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

The lesser long-nosed bat was listed as endangered without critical habitat on September 30, 1988 (53 FR 38456). The lesser long-nosed bat recovery plan was completed in 1994 (USFWS 1994). A 5-year status review of the species was completed in 2007 (USFWS 2007b). No lesser long-nosed bat roosts are known from Forest Service lands in the project area, but three roosts are located on the northeast end of the Chiricahua Mountains, within 1-5 miles of these grazing allotments. Suitable foraging habitat in the form of desert grasslands with stands of agave is present throughout the analysis area, and the area is within foraging distance of known roosts.

Conclusion

We concur with the determination that the action may affect, but is not likely to adversely affect the lesser long-nosed bat, based upon the following:

- There are no roosts within the action area; therefore no direct effects are likely to occur.
- Forage plants are found primarily at the upper elevations of the semi-desert grassland community in the rocky foot-hills of the surrounding mountain ranges. Prescribed fire is not likely to spread through these areas and result in large mortality of forage species.
- Ignition patterns will be used to avoid any areas where high mortality of forage plants is likely.
- Critical habitat is not designated for this species.

Masked Bobwhite (*Colinus virginianus ridgwayi*)

We listed the masked bobwhite as endangered with the original passage of the Endangered Species Conservation Act of 1969 (Public Law 91-135; 83 Stat.275). Shortly after specimens were first collected in 1884, masked bobwhites were essentially extirpated from Arizona (and the United States) by 1900. In the U.S., the species was generally associated with the Santa Cruz and Altar valleys of southeastern Arizona (U.S. Fish and Wildlife Service 1995). Critical habitat is not designated for this species. A recovery plan for the masked bobwhite exists and has been revised several times (U.S. Fish and Wildlife Service 1995). The only known U.S. population was from the BANWR.

Conclusion

We concur that the proposed action may affect, but is not likely to adversely affect the masked bobwhite, based upon the following:

- Masked bobwhite have not been documented recently on the BANWR or off the Refuge in a number of years.
- The proposed action's goals are to remove shrub cover and improve grassland communities in the action area, which should have a long-term beneficial effect on masked bobwhite habitat.
- No critical habitat has been designated for this species.

Mexican Spotted Owl (*Strix occidentalis lucida*)

The Mexican spotted owl was listed as threatened in 1993 (58 FR 14248) and critical habitat was designated in 2004 (69 FR 53182). We appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (U.S. Fish and Wildlife Service 1995). The Recovery Plan summarizes the effects of livestock grazing on Mexican spotted owls in four broad categories: 1) altered prey availability, 2) altered susceptibility to fire, 3) degeneration of riparian plant communities, and 4) impaired ability of plant communities to develop into spotted owl habitat.

Conclusion

After reviewing the status of the Mexican spotted owl, the environmental baseline for the action area, and the effects of the proposed action, we concur that the proposed action may affect, but is not likely to adversely affect, the Mexican spotted owl and designated critical habitat, based upon the following:

- The Mexican spotted owl habitat is only located in the higher elevations of the action area.
- Only a few locations in the action area are known from Baboquivari Mountains.
- The majority of the prescribed fires under this plan will be implemented at lower elevations, outside of Mexican spotted owl habitat.
- Surveys and conservation measures will be implemented to avoid adverse affects to Mexican spotted owl and its habitat.
- No designated critical habitat is within the action area.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher was listed as endangered, without critical habitat on February 27, 1995 (60 FR 10694). On October 19, 2005, we designated critical habitat for the southwestern willow flycatcher (70 FR 60886). A total of 737 river miles across southern

California, Arizona, New Mexico, southern Nevada, and southern Utah were included in the final designation.

A final recovery plan for the southwestern willow flycatcher was released in 2002 (USFWS 2002c). The recovery plan describes the reasons for endangerment and the current status of the species, addresses important recovery actions, includes detailed issue papers on management issues, and provides recovery goals. Recovery is based on reaching numerical and habitat-related goals for each specific Management Unit established throughout the subspecies range and establishing long-term conservation plans (USFWS 2002c).

Critical habitat for southwestern willow flycatcher in Arizona includes portions of the Virgin River Gorge, Verde River, Gila River, Salt River, Tonto Creek, San Pedro River, Little Colorado River, and Big Sandy River.

We concur with the determination that the action may affect, but is not likely to adversely affect the southwest willow flycatcher and designated critical habitat, based upon the following:

- No critical habitat is designated within or adjacent to the action area.
- No southwestern willow flycatcher breeding sites or suitable breeding habitat are currently known from within the action area.
- The only known sightings of southwestern willow flycatchers in the action area are of migrating individuals, which are not likely to be affected by the proposed action.