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In Reply Refer To:

AESO/SE
2-21-98-F-287

March 2, 1999

Mr. John M. McGee
Forest Supervisor
Coronado National Forest
300 West Congress
Tucson, Arizona 85701

Dear Mr. McGee:

This biological opinion responds to your request for consultation with the U.S. Fish and Wildlife Service pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation was dated December 16, 1998, and received by us on January 4, 1999. At issue are impacts that may result from a proposed prescribed fire in the Lone Mountain area on the west slope of the Huachuca Mountains, Cochise County, Arizona. These impacts may affect the following listed species: Huachuca water umbel, *Lilaeopsis schaffneriana* var. *recurva*; Mexican spotted owl, *Strix occidentalis lucida*; lesser long-nosed bat, *Leptonycteris curasoae yerbabuenae*; and Sonora tiger salamander, *Ambystoma tigrinum stebbinsi*; and critical habitat proposed for the Huachuca water umbel.

The Coronado National Forest (Coronado) requested concurrence from the Service that the proposed action may affect but is not likely to adversely affect the Mexican spotted owl. The Service concurs with the Coronado's determination for this species. Rationale for our concurrence is detailed in the "CONCURRENCES" section. The Coronado also determined that the action would not affect several other species. Service policy is that we do not comment on agency "no effect" determinations unless we believe the action would adversely affect a listed species or its critical habitat, in which case the Service would request that the agency enter into formal consultation on species adversely affected [50 CFR 402.14(a)]. Information available to us does not warrant such a request in this instance. However, we recommend that the Coronado maintain a complete administrative record documenting the decision process and supporting information for "no effect" determinations.

This biological opinion was prepared using information from the following sources: your December 16, 1998, request for consultation; the December 4, 1998, biological assessment for the project (U.S. Forest Service, Coronado National Forest 1998a); the December 9, 1998, draft Environmental Assessment (U.S. Forest Service, Coronado National Forest 1998b), the prescribed burning plan (U.S. Forest Service, Coronado National Forest 1998c), and our files. Literature cited in this biological opinion is not a complete bibliography of all literature available on the affected species, nor is it a complete review of the effects of prescribed fire on these species. A complete administrative record of this consultation is on file in our office.

In this biological/conference opinion, the Service concludes that the proposed action is not likely to jeopardize the continued existence of the Huachuca water umbel, lesser long-nosed bat, and Sonora tiger salamander. Nor is the proposed action likely to result in destruction or adverse modification of proposed critical habitat for the water umbel. Reasonable and prudent measures and terms and conditions are presented for the Sonora tiger salamander and lesser long-nosed bat.

CONSULTATION HISTORY

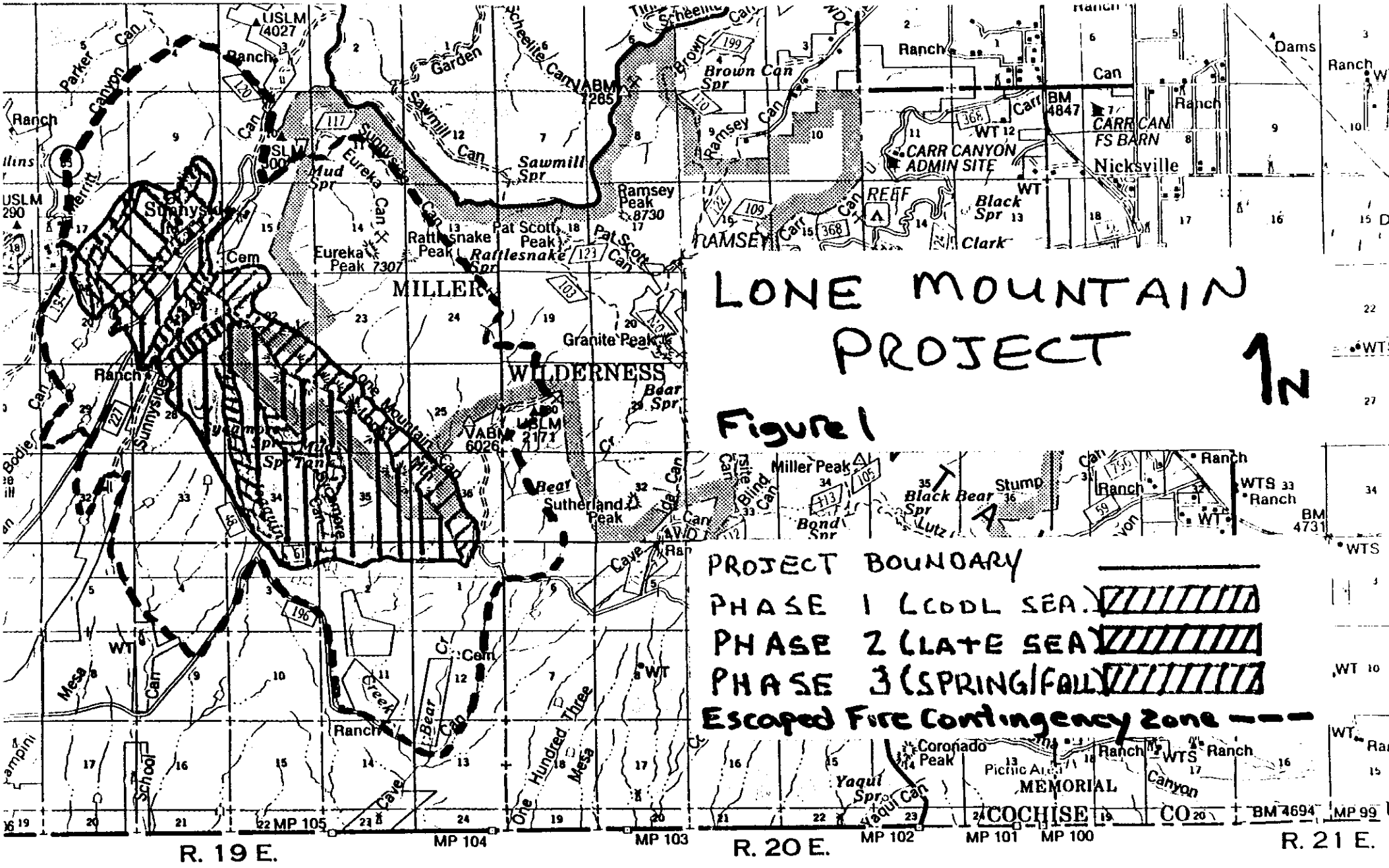
Planning for a prescribed fire in the Lone Mountain area began in 1993 with a scoping process for an ecosystem plan for the southeastern portion of the San Rafael Valley, including Lone Mountain. A meeting was held May 13, 1998, among representatives from the Coronado, the Service, Arizona Game and Fish Department, and the Nature Conservancy to discuss planning for the Lone Mountain burn. Potential effects to sensitive species and their habitats were discussed. On July 27, 1998, the Sierra Vista District Ranger mailed a scoping letter to interested parties in which a proposal for the prescribed fire was outlined. In August, 1998, the Coronado began informal consultation with the Service on development of a biological assessment. A draft biological assessment was submitted to the Service in late September, 1998, for review and comment. The Service responded back with informal comments to the Sierra Vista Ranger District in a letter dated October 29, 1998. The Sierra Vista Ranger District distributed a draft environmental assessment for public review on October 6, 1998. A second draft was released December 9, 1998. The Service responded to the Coronado's December 16, 1998, request for consultation with a letter dated January 4, 1999, stating that the request had been received, all information was included to initiate consultation, and formal consultation had been initiated.

Draft terms and conditions were sent informally to the Mima Falk of the Coronado's Supervisor's Office and to the Sierra Vista Ranger District on February 11 and 16, respectively. A meeting was held on February 18 at the Sierra Vista Ranger District among Service and Coronado personnel to discuss the terms and conditions. It was agreed at the meeting to issue the final opinion as soon as possible.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The Coronado proposes a 5200-acre prescribed fire in three phases: February/March, fall, and May/June of 1999-2000 in the Lone Mountain area of the Huachuca Mountains (T. 23 S., R. 19 E., sections 16 and 17; and T. 23 S., R. 19 E., sections 22, 26, 27, 28, 34 and 36)(Figure 1). The project would be conducted in 1999, if possible; however, as of this writing, conditions are probably too dry to achieve fire objectives in 1999. If conditions preclude implementation in 1999, the project would be rescheduled for 2000 or 2001. The primary goal of the Lone Mountain prescribed burn is to reintroduce managed fires (both natural and purposely ignited) into the ecosystem and return the area to a more natural state. Another goal is to reduce the current


LONE MOUNTAIN PROJECT
Figure 1
1N
PROJECT BOUNDARY
PHASE 1 (COOL SEA.
PHASE 2 (LATE SEA
PHASE 3 (SPRING/FALL
Escaped Fire Contingency Zone
MILLER
WILDERNESS
Sawmill Spr
Mud Spr
Rattlesnake Spr
Bear Spr
Brown Can Spr
Black Spr
Yaqui Spr
Ramsey Peak 8730
Eureka Peak 7307
Granite Peak
Miller Peak
Sutherland Peak
Coronado Peak
Nicksville
CARR CANYON ADMIN SITE
CARR CAN FS BARN
REEF
RAMSEY
MEMORIAL
COCHISE CO
R. 19 E.
R. 20 E.
R. 21 E.
MP 105
MP 104
MP 103
MP 102
MP 101
MP 100
MP 99

amount of fuels on the ground to a more natural fuel load allowing fire to play a more natural role in the environment. Accomplishment of these goals would provide many positive results from a wildlife/habitat perspective, as well as from the perspectives of ecosystem management cost, public safety, gain of scientific knowledge, and others. The objectives of the burn are as follows:

- decrease the potential threat of watershed damage and severe silting from wildfires
- reduce fire suppression cost and preparedness costs through reduction in fuel loading and structural changes in the fuel ladder
- restore a more natural ecosystem function while improving the health of the land
- enhance and improve the habitat and wildlife, including threatened and endangered species
- increase the opportunity to illustrate the beneficial effects of fire
- provide knowledge and experience of burning conditions and results of fire
- Reduce young juniper trees in the grassland by 40 to 50 percent
- Reduce large junipers, height 5 to 10 feet tall with trunk diameter no greater than 9 inches in diameter by 5 to 10 percent
- Increase the grass production in the grassland type by 200 pounds per acres
- Reduce the young oak sprouts in the oak stands from 5 to 10 percent
- Enhance habitat of wildlife and threatened & endangered species by reducing competition, increasing cover and improving the quality of the forage base used
- Burn 40 to 70 percent of the area
- Restore and maintain a more natural ecosystem function
- Increase opportunities for the public to observe natural process occurring in a forest ecosystem

Future expected conditions resulting from a reintroduction of fire include:

- open grasslands with occasional clumps of mature oaks and junipers
- oak savannas with younger trees replacing older trees over time
- increased herbaceous cover, which in turn helps trap sediments and builds up banks along stream channels
- more diverse age classes of trees within riparian areas
- more open pine stands, causing an increase in grasses and forbs
- increased presence of vegetation types that are resistent and resilient to wildfires
- vegetation mosaic with different growth patterns, and increased plant diversity

The fire is divided into three phases. The first phase is scheduled for February/March. The purpose of the early burn will be to develop a black line on the north and east end of the burn. Phase 1 will consist of approximately 1200 acres (see Figure 1 for location of Phase 1 burning). This will burn portions of the area at a time when conditions are not extreme. This burn will also allow the first introduction of fire into Madrean oak woodland and riparian communities. A second treatment of this area may be required in three to five years to move the area toward the desired future condition, but this would be the subject of separate consultation. The second segment of the burn will be conducted when conditions are extreme, either May or June. Relative

humidity will be low, live fuel moisture will be low for juniper and oak, outside air temperature will be high, and winds will be moderate at 15 to 20 miles per hour. The purpose of using the extreme conditions is to reduce the young junipers in the grasslands and the young sprouts in the oak woodland. The riparian areas will have very limited fire allowed into them because of the sensitivity of the species that reside there. During the preparation for the second burn any of the areas that were not black lined in the early burn will have black lines placed around them to prevent intrusion of unwanted fire. Figure 1 shows that the Phase 2 burning would occur primarily outside of riparian areas and the Scotia Canyon area. Phase 3 would occur either in spring or fall, when fire behavior is moderate. Fire would be ignited in the Scotia Canyon area during Phase 3 (Figure 1).

The desired objectives of the cooler burns (Phases 1 and 3) in the Madrean oak woodlands are:

* Within the ignited area, create a mosaic of burned and unburned areas with 30 to 60 percent of the area burned
* Reduce the young oaks sprouts less than 9 inches in diameter within the area by 5 to 10 percent

The objectives of the second burn segment (May/June) are:

* Burn 40 to 70 percent of the 5,200-acre area
* Reduce young juniper trees 40 to 50 per cent
* Eliminate 30 to 60 percent of the oaks less than 9 inches in diameter within the area ignited
* Exclude fire in the pine stringers and the drainages in Sycamore, Joaquin, and Sunnyside canyons by igniting cool season burns and backing fires above and adjacent to these areas prior to the hotter burn ignition
* Limit fire in cultural resource sites and private lands by black lining sensitive areas prior to ignition

If the fire burns into the escaped fire contingency zone (Figure 1) and burns more than 10 acres at any area, the fire would be considered a wildfire and full fire suppression activities would be initiated to halt the fire. Any spread of the fire outside the contingency zone would also be treated as a wildfire with full suppression.

Proposed Mitigation Measures

Measures proposed by the Coronado specifically to mitigate effects to listed species and proposed critical habitat include the following:

1. Monitor effects of fire on the water umbel, agave, and salamander as directed by the Forest Service Biologist and U. S. and Fish and Wildlife Service. Monitor pre/post fire condition of agaves in the area.

2. Establish plots in the areas of concern and complete monitoring for 2 years to determine if there is increase in these species attributable to the burning.

3. Pre-treat junipers with trunk diameters of 9 inch and above where possible to leave a few juniper trees in the fringe areas of the grassland.

4. Have secure black lines and ignite slowly to determine how the fire is going to behave. Monitor weather and make sure there are no severe changes in the weather that might lead to erratic fire behavior.

5. Secure a wide area all around the area during the early burn.

6. Implementation of the proposed action will include use of the best management practices. Prescription elements will include such factors as weather, slope, aspect, soils, soil moisture, fuel types and amount, and fuel moisture. All these factors influence the fire intensity and thus have a direct effect on whether or not a litter layer remains after burning and whether or not a water repellent layer is formed. Spatial distribution and contiguous size of the planned burn area in a watershed are considered in developing prescriptions to reduce the effects of peak flow change on channels.

To prevent water quality degradation, the following techniques will be integrated into the plan.

1. Construct waterbars in firelines
2. Maintain the integrity of streamside management zone
3. Avoid intense fire on sensitive soils, which may promote water repellency, nutrient leaching, and erosion
4. Retain or plan for sufficient ground cover to prevent erosion of the burned site
5. Modify desired fire behavior prescription relative to burn unit location on watershed
6. Reduce fuel loading in drainage channels

Other measures are proposed to mitigate possible effects to resources other than listed species and proposed critical habitat (U.S. Forest Service, Coronado National Forest 1998c).

ANALYSES BY SPECIES:

Huachuca Water Umbel

STATUS OF THE SPECIES

The Huachuca water umbel was listed as an endangered species on January 6, 1997. Critical habitat was proposed on the upper San Pedro River, Garden Canyon on Fort Huachuca, and other areas of the Huachuca Mountains, San Rafael Valley, and Sonoita Creek on December 30, 1998. The umbel is an herbaceous, semiaquatic perennial plant with slender, erect leaves that grow from creeping rhizomes. The leaves are cylindrical, hollow with no pith, and have septa (thin partitions) at regular intervals. The yellow/green or bright green leaves are generally 0.04-0.12 inch in diameter and often 1-2 inches tall, but can reach up to8 inches tall under favorable conditions. Three to 10 very small flowers are borne on an umbel that is always shorter than the

leaves. The fruits are globose, 0.06-0.08 inch in diameter, and usually slightly longer than wide (Affolter 1985). The species reproduces sexually through flowering and asexually from rhizomes, the latter probably being the primary reproductive mode. An additional dispersal opportunity occurs as a result of the dislodging of clumps of plants which then may reroot in a different site along aquatic systems.

Huachuca water umbel was first described by Hill (1926) based on the type specimen collected near Tucson in 1881. Hill applied the name *Lilaeopsis recurva* to the specimen, and the name prevailed until Affolter (1985) revised the genus. Affolter applied the name *L. schaffneriana* ssp. *recurva* to plants found east of the continental divide.

Huachuca water umbel has been documented from 25 sites in Santa Cruz, Cochise, and Pima counties, Arizona, and in adjacent Sonora, Mexico, west of the continental divide (Haas and Frye 1997, Saucedo 1990, Warren *et al.* 1989, Warren *et al.* 1991, Warren and Reichenbacher 1991, Service files). The plant has been extirpated from 6 of the 25 sites. The 19 extant sites occur in four major watersheds - San Pedro River, Santa Cruz River, Rio Yaqui, and Rio Sonora. All sites are between 3,500 to 6,500 feet elevation.

Huachuca water umbel has an opportunistic strategy that ensures its survival in healthy riverine systems, cienegas, and springs. In upper watersheds that generally do not experience scouring floods, the umbel occurs in microsites where interspecific plant competition is low. At these sites, the umbel occurs on wetted soils interspersed with other plants at low density, along the periphery of the wetted channel, or in small openings in the understory. The upper Santa Cruz River and associated springs in the San Rafael Valley, where a population of Huachuca water umbel occurs, is an example of a site that meets these conditions. The types of microsites required by the umbel were generally lost from the main stems of the San Pedro and Santa Cruz rivers when channel entrenchment occurred in the late 1800's to early 1900's. Habitat on the upper San Pedro River is recovering, and Huachuca water umbel has recently been found along short reaches of the main channel.

In stream and river habitats, Huachuca water umbel can occur in backwaters, side channels, and nearby springs. After a flood, it can rapidly expand its population and occupy disturbed habitat until interspecific competition exceeds its tolerance. This response was recorded at Sonoita Creek in August 1988, when a scouring flood removed about 95 percent of the Huachuca water umbel population (Gori *et al.* 1990). One year later, the umbel had recolonized the stream and was again codominant with watercress, *Rorippa nasturtium-aquaticum* (Warren *et al.* 1991). The expansion and contraction of Huachuca water umbel populations appear to depend on the presence of "refugia" where the species can escape the effects of scouring floods, a watershed that has an unaltered hydrograph, and a healthy riparian community that stabilizes the channel.

Density of umbel plants and size of populations fluctuate in response to both flood cycles and site characteristics. Some sites, such as Black Draw, have a few sparsely-distributed clones, possibly due to the dense shade of the even-aged overstory of trees, dense nonnative herbaceous layer beneath the canopy, and deeply entrenched channel. The Sonoita Creek population occupies 14.5

percent of a 5,385 square foot patch of habitat (Gori *et al.* 1990). Some populations are as small as 11-22 square feet. The Scotia Canyon population, by contrast, has dense mats of leaves. Scotia Canyon contains one of the larger Huachuca water umbel populations, occupying about 57 percent of the 4,756 foot perennial reach (Gori *et al.* 1990; Jim Abbott, Coronado National Forest, Tucson, AZ, in litt. 1994).

While the extent of occupied habitat can be estimated, the number of individuals in each population is difficult to determine because of the intermeshing nature of the creeping rhizomes and the predominantly asexual mode of reproduction. A "population" of Huachuca water umbel may be composed of one or many genetically distinct individuals.

Overgrazing, mining, hay harvesting, timber harvest, fire suppression, and other activities in the nineteenth century led to widespread erosion and channel entrenchment in southeastern Arizona streams and cienegas when above-average precipitation and flooding occurred in the late 1800's and early 1900's (Bahre 1991, Bryan 1925, Dobyns 1981, Hastings and Turner 1980, Hendrickson and Minckley 1984, Martin 1975, Sheridan 1986, Webb and Betancourt 1992, Hereford 1993). A major earthquake near Batepito, Sonora, approximately 40 miles south of the upper San Pedro Valley, resulted in land fissures, changes in groundwater elevation and spring flow, and may have preconditioned the San Pedro River channel for rapid flood-induced entrenchment (Hereford 1993, Geraghty and Miller, Inc. 1995). These events contributed to long-term or permanent degradation and loss of cienega and riparian habitat on the San Pedro River and throughout southern Arizona and northern Mexico. Much habitat of the Huachuca water umbel and other cienega-dependent species was presumably lost at that time.

Wetland degradation and loss continues today. Human activities such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, chaining, agriculture, mining, sand and gravel operations, road building, nonnative species introductions, urbanization, wood cutting, and recreation all contribute to riparian and cienega habitat loss and degradation in southern Arizona. The local and regional effects of these activities are expected to increase with the increasing human population.

Dredging extirpated the Huachuca water umbel from House Pond, near the extant population in Black Draw (Warren *et al.* 1991). The umbel population at Zinn Pond in St. David near the San Pedro River was probably lost when the pond was dredged and deepened. This population was last documented in 1953 (Warren *et al.* 1991).

Livestock grazing can affect the umbel through trampling and changes in stream hydrology and loss of stream bank stability. However, existence of the umbel appears to be compatible with well-managed livestock grazing (Service 1997). In overgrazed areas, stream headcutting can threaten cienegas where the umbel occurs. Such headcutting occurs at Black Draw just south of the international boundary and at Los Fresnos, in the San Rafael Valley, Sonora. Groundwater pumping has eliminated habitat in the Santa Cruz River north of Tubac, and threatens habitat in the San Pedro River. Portions of the San Pedro River occupied by the umbel could be dewatered within a few years unless measures are implemented very soon to halt or mitigate groundwater

pumping in the Sierra Vista-Fort Huachuca area (ASL 1998). Severe recreational impacts in unmanaged areas can compact soils, destabilize stream banks, and decrease riparian plant density, including densities of the Huachuca water umbel. Populations in Bear Canyon in the Huachuca Mountains have been impacted by trampling and off-highway vehicles.

A suite of nonnative plant species has invaded wetland habitats in southern Arizona (Stromberg and Chew 1997), including those occupied by the Huachuca water umbel (Arizona Department of Water Resources 1994). In some cases their effect on the umbel is unclear. However, in certain microsites, the nonnative Bermuda grass, *Cynodon dactylon*, may directly compete with the umbel. Bermuda grass forms a thick sod in which many native plants are unable to establish. Watercress is another nonnative plant now abundant along perennial streams in Arizona. It is successful in disturbed areas and can form dense monocultures that can outcompete Huachuca water umbel populations.

Limited numbers of populations and the small size of populations make the Huachuca water umbel vulnerable to extinction as a result of stochastic events that are often exacerbated by habitat disturbance. For instance, the restriction of this taxon to a relatively small area in southeastern Arizona and adjacent Sonora increases the chance that a single environmental catastrophe, such as a severe tropical storm or drought, could eliminate populations or cause extinction. Populations are in most cases isolated, as well, which makes the chance of natural recolonization after extirpation less likely. Small populations are also subject to demographic and genetic stochasticity, which increases the probability of population extirpation (Shafer 1990, Wilcox and Murphy 1985).

ENVIRONMENTAL BASELINE

Vegetation Communities and Environmental Setting

The project area lies on the west slope of the Huachuca Mountains in southeastern Arizona. Elevations in the primary burn area range from 6,475 feet on Lone Mountain to approximately 5,400 feet near the confluence of Sycamore and Joaquin canyons. The escaped fire contingency zone ranges from approximately 7,600 to 5,250 feet. Terrain is mountainous and steep at the higher elevations, but fairly rolling and gentle terrain dominates at the lower elevations. Vegetation communities include Petran montane conifer forest, madrean evergreen woodland, and plains/great basin grasslands (Brown 1982, Brown and Lowe 1980). Riparian plant associations occur as stringers in canyon bottoms. Within the primary burn area, riparian vegetation occurs within Scotia, Lone Mountain, Sunnyside, Joaquin, Bear, and Sycamore canyons, and associated tributaries. Patches of chaparral communities also occur within the project area (U.S. Forest Service, Coronado National Forest 1998a).

The Huachuca Mountains have a long history of human use. However, it is unclear precisely how those uses affected the habitats of the Huachuca water umbel. Evidence of historic mining activity are commonly encountered throughout the mountain range (Taylor 1991), but mining was probably more important in the Patagonia Mountains to the west and at Tombstone and Bisbee

(Hadley and Sheridan 1995, Hereford 1993). Nevertheless, direct impacts of mining, such as tailings piles, roads, areas cleared for settlements, and probably most importantly, fuelwood harvest to support the mines and settlers, likely resulted in localized denuded landscapes and degraded watersheds (Hadley and Sheridan 1995.) A sawmill operated in Sunnyside Canyon probably in the late 1800s. Other sawmills operated in Carr, Ramsey, Sawmill, and Miller canyons (Taylor 1991). By 1902 all usable timber had been harvested from the Huachuca Mountains (General Wildlife Services undated [draft report]).

Cattle were grazed in the area as early as 1680 (Hadley and Sheridan 1995). Free-ranging cattle were abundant on Fort Huachuca in 1886 when the post quartermaster requested fencing of the installation to protect forage for cavalry horses (General Wildlife Services undated). Severe drought combined with overstocking in the 1880s and 1890s led to overgrazing in the region. During the drought, some ranchers drove cattle from the San Rafael Valley into the Huachuca Mountains where forage was cut from oak and ash trees to keep the cattle alive (Hadley and Sheridan 1995.) The Huachuca Forest Reserve, a precursor to the Coronado National Forest, was established in 1906. At that time policies were initiated to limit grazing to within range capacity and to protect timber resources. These policies were strengthened over time.

Fire regimes for the Garden Canyon watershed and in a study area around Pat Scott Peak in the Huachuca Mountains were reconstructed using dendrochronological methods (Danzer *et al.* 1997). Before 1870, fires were frequent (mean of 4-8 years), low-intensity (ground fires), and widespread. Since 1870, only 2 widespread fires occurred (1899 and 1914) in the study area. Danzer *et al.* (1997) attribute this change in fire regime to extensive use of timber, mineral, range, and water resources and associated reductions in fuel loads. Active fire suppression by the Forest Service and others also reduced fire frequency. Exclusion of fire has promoted encroachment of shade-tolerant, less fire-resistant tree species such as Douglas fir, gambel oak, and southwestern white pine, and inhibited growth of pondersosa pine. The 1899 fire was a devastating crown fire that halted all large-scale logging operations at the "Reef" in Carr Canyon and below Ramsey Peak on Fort Huachuca (Danzer *et al.* 1997.) Danzer *et al.* (1997) suggest that the fire regime has been altered from frequent, low intensity fire to infrequent, stand-replacing fires. Recent stand-replacing fires on Carr Peak, Miller Peak, and Pat Scott Peak support this hypothesis.

In grassland and oak woodlands of southeastern Arizona, fire intervals can only be inferred from adjacent forest communities where dendrochronological evidence can be collected, or from historical accounts. Fire return intervals in the desert grassland community have been estimated at approximately 8 to 20 years (Wright and Baily 1982, McPherson 1995, Kaib *et al.* 1996, Howell 1996). Natural fire has been excluded from these communities primarily as a result of livestock overgrazing and drought which removed fine fuels, and past fire suppression. Lack of natural fires and overgrazing have resulted in encroachment or increased density of woody species such as mesquite and juniper, and various half-shrub woody species. There has also been a reduction in coverage of perennial grasses. This conversion of grasslands to shrublands and woodlands has reduced available forage for livestock and some wildlife species, runoff and soil erosion has increased, and some wildlife species characteristic of woodlands have benefitted.

Status of Huachuca Water Umbel in the Project Area

Localities of the Huachuca water umbel in the project area are summarized in U.S. Forest Service, Coronado National Forest (1998a) and Haas and Frye (1997). Within the primary burn area, the water umbel is found in a 1.3 mile (U.S. Forest Service, Coronado National Forest 1998a) reach of Scotia Canyon, an approximately 0.2 mile reach of Sycamore Canyon immediately downstream of Sycamore Spring, Mud Spring, and a 0.75 mile (U.S. Forest Service, Coronado National Forest 1998a) reach of Lone Mountain Canyon. The latter canyon is just inside the southeastern boundary of the primary burn area. Populations inside the escaped fire contingency area, but outside of the primary burn area include an approximate 3.5 mile reach of Bear Canyon and associated tributaries of Bear and Lone Mountain Canyons (U.S. Forest Service, Coronado National Forest 1998a, Haas and Frye 1997), an 0.8 mile reach of Scotia Canyon, and a 0.4 mile reach of Sunnyside Canyon. Other populations occur outside the escaped fire contingency area, but nearby in upper Bear, Garden, Sawmill, and Joaquin canyons, and several sites in the San Rafael Valley. Estimated area occupied by the water umbel in some sites, such as Scotia and Lone Mountain canyons vary between the Haas and Frye (1997) and U.S. Forest Service, Coronado National Forest (1998a) reports. However, this likely represents expansion and contraction of water umbel populations in response to floods, drought, and other factors. The Service considers all sites in the project area where the species has been found by Haas and Frye (1997), U.S. Forest Service, Coronado National Forest (1998a), or other authors, to be suitable habitat for the species, although at any one time or in specific sites the plant may be rare or absent.

The project area is in the heart of the montane distribution of the Huachuca water umbel. Critical habitat is proposed in the primary burn area and/or the escaped fire contingency area in Scotia, Sunnyside, Bear, and Lone Mountain canyons and associated tributaries of the latter two canyons. Critical habitat is also proposed in Joaquin Canyon immediately downstream of the escaped fire contingency. The only other large reach of habitat for this species is on the upper San Pedro River, where 33.7 miles are proposed for critical habitat designation. The San Pedro River is considered the most important recovery habitat.

Most canyons in the Huachuca Mountains today are either too dry to support Huachuca water umbel, or existing permanent streams exhibit high gradients in narrow, shaded canyons that do not provide the boggy, cienega conditions required by this plant. Whether conditions were different in pre-settlement times is unknown and cannot be reconstructed from available historic accounts. However, erosion due to watersheds degraded by overgrazing, timber harvest, and mining; and erosion and downcutting in streams after stand-replacing fires that began in 1899, may have largely eliminated cienega habitats in the canyons of the Huachuca Mountains. Observations of historic versus current distribution of leopard frogs, *Rana pipiens* complex, suggest wetland habitats in the canyons of the Huachuca Mountains may have been altered in historic times. Leopard frogs, which are primarily frogs of low-gradient streams and boggy pools and ponds, were once found in many canyons in the Huachuca Mountains. The frogs are largely absent today, low-gradient streams and sizeable natural pools and ponds are almost nonexistent, and the only places leopard frogs are found with regularity in the Huachuca Mountains are constructed ponds and livestock tanks.

EFFECTS OF THE PROPOSED ACTION

Catastrophic, stand-replacing fires and subsequent runoff and erosion of canyon bottoms are probably the greatest threats to Huachuca water umbel populations in the Huachuca Mountains. Degradation of watershed condition immediately after fires can result in dramatically increased runoff, sedimentation, and debris flow that can scour aquatic habitats in canyon bottoms or bury them in debris (DeBano and Neary 1996). In degraded watersheds, less precipitation is captured and stored, thus perennial aquatic systems downstream may become ephemeral during dry seasons or drought (Rinne and Neary 1996). These conditions could result in decline or extirpation of Huachuca water umbel populations in canyons of the Huachuca Mountains affected by fire. Populations of lemon lily, *Lilium parryi*, also a riparian species, have undergone dramatic decline in the Huachuca Mountains as a result of flooding, some of which is associated with post-fire runoff (Wood 1992). Bowers and McLaughlin (1994) found that the following riparian plants have been extirpated from the Huachuca Mountains as a result of floods or debris flow: *Dryopteris fili-mas, Aster coerulescens, Monarda fistulosa, Oenothera kunthiana, Rubus arizonensis,* and *Glyceria borealis*. Major, recent stand-replacing fires have occurred in 1977 and 1991 (upper Carr, Miller, Hunter canyons), 1983 (Pat Scott Canyon), and 1988 (Ash Canyon to the international boundary)(Danzer *et al.* 1997, Taylor 1991). The replacement of frequent ground fires by infrequent, stand-replacing fires, and resulting decline and extirpation of some riparian plant species are likely due to human uses, such as grazing, fire suppression, and logging, that reduced fine fuels and fire frequency (Danzer *et al.* 1977, Robinett *et al.* 1997, Swetnam and Baisan 1996).

One of the purposes of the Lone Mountain prescribed fire is to promote a vegetation mosaic this is resistant and resilient to wildfires, and to decrease the potential threats of watershed damage or severe silting of streams as a result of wildfire (U.S. Forest Service, Coronado National Forest 1998a&b). If planned and carried out carefully, the long-term effects of a prescribed fire should be improvement of watershed riparian condition and reduced probability of catastrophic stand-replacing fires. However, in the short-term, even well-planned and executed fires are likely to result in some adverse effects to watersheds, and increased flooding, erosion, and siltation of canyon bottoms. In addition, fire is an imprecise tool and its effects are not entirely predictable. For instance, during the Maverick prescribed fire in 1997 (Peloncillo Mountains, Coronado National Forest), the fire escaped control, jumped Geronimo Trail and a ridge to the north, and destroyed a dense stand of mature Chihuahua pine, *Pinus leiophylla*, in Whitmire Canyon; which was habitat for the threatened New Mexico ridgenose rattlesnake, *Crotalus willardi obscurus*.

The primary burn area is generally lower in elevation than the areas burned by major crown fires that destroyed stands of pine-oak and mixed conifer forest types on the mountain tops in 1977, 1983, 1988, and 1991. Crown fires at the higher elevations are generally more damaging to riparian bottoms because they are upstream and precipitation is greatest at high elevation. Such fires in pine-oak and mixed conifer woodland are probably more likely to degrade watersheds as well, because they are in the steepest part of the range and removal of vegetation may be greater and for a longer period of time. In the oak woodlands and savannas of the lower slopes, erosion is less likely, and vegetation cover may recover more quickly due to less steep terrain, less

precipitation, and a prevalence of grasses and shrubs that resprout rapidly after fire. Oaks and junipers also often resprout after fire, whereas the conifers of higher elevation generally do not.

The Lone Mountain burn plan calls for cool season burning (February/March) in the riparian areas where water umbel occurs, as well as most of the more heavily-wooded areas of the eastern and northern portions of the primary burn area (U.S. Forest Service, Coronado National Forest 1998c). Cool season (Spring or Fall) burning is also prescribed in the oak woodlands and grasslands surrounding the Scotia Canyon area (Figure 1). If these fires behave as expected, burning should be largely restricted to ground fires that reduce fine fuels while leaving mature trees intact and alive. The Huachuca water umbel existed historically with a regime of frequent ground fires. The proposed cool season fires in water umbel habitat should mimic these historic fires. When fire is introduced during May or June, areas that were burned in February or March should burn very little or not at all. An exception may be the northeast slope of Lone Mountain Canyon, which is vegetated with relatively dense stands of brush and trees. If the May/June fire (Phase 2) burns over the top of Lone Mountain from the southwest, it could flare up in this area if it burned into the canopy. However, this would be a backing fire, and fuels would be reduced probably greatly due to the cool season fire. Thus, fire intensity in this area during Phase 2 should be much reduced in comparison to a scenario in which the area sustained a May/June fire without pre-treatment. Another area of possible concern is the area northwest of Sunnyside Canyon. This area is prescribed for Phase 3, which if burned in the Spring before Phase 2, would be in a condition to readily sustain a hot fire, because fuels would be reduced. However, if Phase 3 is scheduled in the Fall after Phase 2, then there is a possibility that a hot fire could sweep through the area and destroy mature trees (because a cool season pretreatment of the area would not have occurred before Phase 2.) If the fire burned into the escaped fire contingency zone, it could affect additional populations of the water umbel in Bear Canyon and associated tributaries, and Joaquin, upper Scotia, and upper Sunnyside canyons. However, if an area of the escaped fire contingency zone burned in excess of 10 acres, it would be treated as a wildfire and would likely be suppressed very rapidly.

Although active fire suppression is critical to reduce damage from wildfire, suppression activities can adversely affect the water umbel. Decisions made during fire suppression can affect the degree and intensity of fire effects, and the type and location of suppression activities could directly or indirectly affect water umbel habitat. For example, a decision to locate a fire crew camp at a water umbel site could result in trampling and habitat destruction. Use of heavy equipment, such as tracked vehicles, to cut fire lines or reduce fuels could destroy habitat, cause erosion, or create new routes of travel that may lead to increased access and recreational impacts.

The Coronado has not proposed any modifications to grazing strategies after the fire. Grasses would be expected to recover to pre-burn levels within three years (Cable 1967), but their recovery can be slowed significantly by livestock grazing. If grasses and other understory plants do not recover rapidly, watershed condition will not recover as well. As discussed, degraded watersheds can result in degraded stream habitat for the water umbel. Dan Robinett (Natural Resource Conservation Service, Tucson, Arizona, pers. comm. 1996) recommends resting burned sites above 4,000 feet from grazing for a two year period to facilitate recovery.

Effects to Proposed Critical Habitat

Critical habitat for the Huachuca water umbel was proposed in the primary burn area, the escaped fire contingency zone, and nearby areas of Scotia Canyon (3.4 miles), Sunnyside Canyon (0.7 mile), Bear Canyon (1.1 mile), Lone Mountain Canyon and associated tributaries (3.2 miles), and Joaquin Canyon (0.4 mile); which totals 8.8 miles, or 17 percent of the total stream/river miles proposed as critical habitat. The only large reach of umbel habitat is on the upper San Pedro River, where 33.7 miles are proposed for critical habitat designation. Total stream miles of proposed critical habitat within the primary burn area include 1.2 mile of Scotia Canyon and 0.8 mile of Lone Mountain Canyon (4 percent of proposed critical habitat stream/river miles).

Effects analyses must determine if the proposed action would destroy or adversely modify proposed critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of proposed critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02). The primary constituent elements identified in the proposed rule as necessary for the survival and recovery of the Huachuca water umbel include, but are not limited to, the habitat components which provide the following:

(1) Sufficient perennial base flows to provide a permanently wetted substrate for growth and reproduction of Huachuca water umbel;

(2) A stream channel that is stable and subject to periodic flooding that provides for rejuvenation of the riparian plant community and produces open microsites for water umbel expansion;

(3) A riparian plant community that is stable over time and in which nonnative species do not exist or are at a density that has little or no adverse effect on resources available for water umbel growth and reproduction; and

(4) Refugial sites in each watershed and in each stream reach, including but not limited to springs or backwaters of mainstem rivers, that allow each population to survive catastrophic events and recolonize larger areas.

As discussed elsewhere in the "Effects of the Action", Scotia Canyon is proposed for Phase 1 (cool season - February/March), and the adjacent watershed is proposed for Phase 3 (spring or fall). These cool season fires should reduce fuel loads while minimizing the probability of a stand-replacing crown fire. Lone Mountain Canyon is also proposed for a Phase 1 fire, although the Service has some concern for possible effects of fire on the northeast slope of Lone Mountain due to heavy fuel loads there. A fire that consumes much of this fuel could lead to erosion of the hillside and scouring and/or sedimentation of the water umbel habitat in the canyon bottom. However, if fire is managed carefully here, fuel loads could be reduced with minimal impact to the watershed and water umbel habitat. If the objectives of the fire are achieved, the probability

of a wildfire that would remove vegetation cover on the northeast slope of Lone Mountain and lead to degradation of water umbel critical habitat is reduced.

The Service believes that the probability of critical habitat being affected outside of the primary burn area is small. If the fire burned into the escaped fire contingency zone and burned more than 10 acres it would be treated as a wildfire and full suppression action would be initiated. However, in the event that the May/June Phase 2 fire burned out of control in water umbel habitat, damage to critical habitat could be severe in places because these areas would not have been preconditioned for a hot fire with cool season burning, as proposed for Scotia and Lone Mountain canyons.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, or local private actions that are reasonably certain to occur in the project area. 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. Effects of past Federal and private actions are considered in the Environmental Baseline. Because of the extent of Federal lands in the project area, few non-Federal activities are expected occur. Exceptions include grazing activities on inholdings of the Lone Mountain ranch, private lands at the historic townsite of Sunnyside, and at other scattered private parcels. No State lands are known to occur in the project area.

Effectiveness of Proposed Mitigation

Prescribing cool season fires in and near water umbel habitat is the most important feature of the project in regard to mitigating possible adverse effects to the water umbel and proposed critical habitat. However, the Coronado proposed several other mitigating measures that would further reduce adverse effects to the Huachuca water umbel. Some of the most important of these are slow ignition to determine how the fire might behave, avoidance of intense fire on sensitive soils, and maintenance of streamside management zone integrity. Monitoring of fire effects will also assist in designing future prescribed fires in a manner that will maximize benefits to the water umbel.

Mitigation measures do not adequately address post-fire adverse effects of livestock grazing, which can retard recovery of watershed condition. Addition of a Resource Advisor to the fire management staff that could advise the Fire Boss before and during the fire of issues regarding water umbel could also be useful in ensuring that fire decisions are made with a full understanding of possible effects to the water umbel and its habitat.

CONCLUSION

After reviewing the current status of the Huachuca water umbel, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of

the Huachuca water umbel. Nor is the proposed action likely to result in adverse modification and destruction of proposed critical habitat. We present these conclusions for the following reasons:

1) In the long-term, the proposed action should help restore to the Lone Mountain area an ecological condition that existed historically, in which frequent ground fires occurred and catastrophic stand-replacing fires were less of a threat than today. Huachuca water umbel populations are expected to be more stable under future conditions with the project.

2) Water umbel habitats and adjacent watersheds would be treated with cool season fire, which should mimic historic fire behavior and reduce the likelihood of catastrophic stand-replacing fire.

3) If the fire burns into the escaped fire contingency zone and burns more than 10 acres at any one point, full suppression would be initiated to stop the fire from spreading.

4) The Coronado proposes a number of mitigation measures that reduce the likelihood of adverse effects to the umbel and its habitat.

5) The primary burn area, in which most or all of the prescribed fire will be contained, includes a relatively small percentage (four percent) of proposed critical habitat.

Note that in regard to "take" of listed species in sections 7(b)(4) and 7(o)(2) of the Act, these sections generally do not apply to listed plant species, thus no incidental take statement is included here for the Huachuca water umbel. 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 and malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the Huachuca water umbel. In furtherance of the purposes of the Act, we recommend implementing the following actions:

1) The Coronado should provide assistance to the Service in developing a recovery plan for the Huachuca water umbel.

2) One of the objectives of the Lone Mountain prescribed fire should be protection of Huachuca water umbel and its habitat, both in the short term and the long term. This objective would not in any way constrain the fire boss from taking any action as needed to protect life or property.

3) A Resource Advisor(s) should be on the fire during all fire activities. Resource Advisors should be qualified biologists with knowledge of the water umbel and its habitat. The Resource Advisor should be knowledgeable of water umbel localities in and near the project area. Resource Advisor(s) should coordinate water umbel concerns and serve as an advisor to the fire boss. They should also serve as field contact representatives responsible for coordination with the Service. They should monitor fire activities to ensure protective measures endorsed by the fire boss are implemented. Resource Advisors should be on call 24 hours a day during treatments.

4) Areas of significant human activity during fire activities (prescribed fire and any subsequent suppression if needed), such as fire crew camps, landing strips, and equipment staging areas, should be located outside of water umbel habitat. Areas disturbed during fire activities, such as fire lines, crew camps, and staging areas should be rehabilitated, including the obliteration of fire lines to prevent their use by vehicles or hikers.

5) Off-road vehicle activity should be kept to a minimum during fire activities. Vehicles should be parked as close to roads as possible, and vehicles should use wide spots in roads or disturbed areas to turn around.

6) The Coronado should be very cautious of and conservative in its use of prescribed fire in Lone Mountain Canyon to prevent loss of vegetation cover and subsequent erosion and sedimentation of umbel habitat in the canyon bottom.

7) The Coronado should rest from grazing burned areas in the watersheds of Huachuca water umbel sites for the first two summer growing seasons (July, August, and September) following implementation of the final phase of the fire. No grazing during July, August, and September should occur in burned areas between phases.

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

Lesser Long-nosed Bat
STATUS OF THE SPECIES

The lesser long-nosed bat was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered on September 30, 1988 (53 FR 38456). No critical habitat has been designated for this species. The lesser long-nosed bat is a small, leaf-nosed bat. It has a long muzzle and a long tongue, and is capable of hover flight. These features are adaptations to feed on nectar from the flowers of columnar cactus, such as the saguaro and organ pipe cactus and from paniculate agaves, such as Palmer's agave, *Agave palmeri*, and Parry's agave, *A. parryi* (Hoffmeister 1986).

Palmer's agave exhibit many characteristics of chiropterophily, such as nocturnal pollen dehiscence and nectar production, light colored and erect flowers, strong floral order, and high levels of pollen protein with relatively low levels of nectar sugar concentrations (Slauson 1996). Parry's agave demonstrates many (though not all) of these same morphological features (Gentry 1982).

The lesser long-nosed bat is migratory and found throughout its historic range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. It has been recorded in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County), and south to the international boundary. Roosts in Arizona are typically occupied from as early as late April to as late as early October (Cockrum and Petryszyn 1991, Sidner 1996); the bat has only rarely been recorded outside of this time period in Arizona (Fleming 1995, Hoffmeister 1986). In spring, adult females, most of which are pregnant, arrive in Arizona gathering into maternity colonies. These roosts are typically at low elevations near concentrations of flowering columnar cacti. After the young are weaned these colonies disband in July and August; some females and young move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves, particularly Palmer's agave. Adult males typically occupy separate roosts forming bachelor colonies. Males are known mostly from the Chiricahua Mountains but also occur with adult females and young of the year at maternity sites (Fleming 1995). Throughout the night between foraging bouts both sexes will rest in temporary night roosts (Hoffmeister 1986).

As indicated above, the lesser long-nosed bat consumes nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. These bats often forage in flocks. Nectar of these cacti and agaves are high energy foods. Concentrations of some food resources appear to be patchily distributed on the landscape and the nectar of each plant species utilized is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available primarily from July through October. Columnar cacti occur in lower elevation areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desert scrub areas, desert grasslands and shrublands, and into the oak woodland (Gentry 1982). In the Huachuca Mountains, Parry's agave is generally found at higher elevations than Palmer's agave; the former is common in forest openings to the crest of the Huachuca Mountains.

Lesser long-nosed bats appear to be opportunistic foragers and efficient fliers. Seasonally available food resources may account for the seasonal movement patterns of the bat. The lesser long-nosed bat is known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 15 miles, and in Mexico at 25 miles and 38 miles (one way)(Dalton *et al.*1994, Yar Petryszyn, University of Arizona, Tucson, pers. comm. 1997). Fleming (1995) suggests that a substantial portion of the lesser long-nosed bats at the Pinacate Cave in Sonora fly 25 to 31 miles each night to foraging areas in Organ Pipe Cactus National Monument. Horner *et al.* (1990) found that lesser long-nosed bats commuted 15.5 miles between an island maternity roost and the mainland in Sonora. The

authors suggested that bats regularly flew at least 47 miles each night. Lesser long-nosed bats have been recorded visiting individual blooming Palmer's agaves up to 3,800 visits per night (Yar Petryszyn, pers.comm. 1999), while other agaves may not be visited at all (Liz Slauson, Desert Botanical Gardens, Phoenix, Arizona, pers. comm. 1997). Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest known potential roost site (Yar Petryszyn, pers. comm. 1997). Agaves in wooded areas, and agaves close to roosts, appear to be used more frequently than agaves in open areas or far from roosts (Yar Petryszyn, pers. comm. 1999). Use of agaves in wooded areas may be an adaptation for predator avoidance.

Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (Fleming 1995). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever the factors are that determine selection of roost locations, the species appears to be sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days. However, this sensitivity suggests that the presence of alternate roost sites may be critical when disturbance occurs. Interspecific interactions with other bat species may also influence lesser long-nosed bat roost requirements.

Known major roost sites include 16 large roosts in Arizona and Mexico (Fleming 1995). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same surveys, the maternity roosts are occupied by over 150,000 lesser long-nosed bats. The numbers above indicate that although a relatively large number of these bats are known to exist, the relative number of known large roosts is small. Disturbance of these roosts and the food plants associated with them could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

ENVIRONMENTAL BASELINE

No records are known of lesser long-nosed bat in the project area. However, numerous roosts are known within a reasonable foraging distance (~40 miles) including: 1) Panama Mine near Pyeatt Ranch on the western boundary of Fort Huachuca, 2) Pyeatt Cave, Fort Huachuca, 3) Manila Mine, Fort Huachuca, 4) Woodcutters Canyon, Fort Huachuca, 5) Wren Bridge, Fort Huachuca, 6) Brown Canyon, Huachuca Mountains, 7) Canelo Mine 8 miles west of Fort Huachuca, 8) Miller Canyon, Huachuca Mountains, 9) San Pedro Riparian National Conservation Area at Fairbank, 10) Ramsey Canyon, Huachuca Mountains, 11) State of Texas Mine, Coronado National Memorial, Huachuca Mountains, 12) Cave of the Bells, Santa Rita Mountains, 13) Helvetia, Santa Rita Mountains, 14) Madera Canyon, Santa Rita Mountains, 15) Empire Ranch north of Sonoita, 16) Red Cave, Whetstone Mountains, and 17) several localities near Patagonia, including the Patagonia Bat Cave (Cockrum and Petryszyn 1991, Fleming 1995, Sidner 1993, 1994). Of the

above sites, Fleming (1995) considered the Patagonia Bat Cave, State of Texas Mine, Manila Mine, and the Cave of Bells to be major post-maternity roosts of the lesser long-nosed bat. All of these are within foraging distance of the project area, and cumulatively they supported more than 70,000 lesser long-nosed bats in the early 1990s. The former two support the greatest number of bats (Fleming 1995, Sidner 1997). The State of Texas Mine, which has supported up to 20,000 lesser long-nosed bats in recent years, is located approximately 5 miles southeast of the southern edge of the escaped fire contingency area.

Three major maternity roosts and five major post-maternity roosts are known in Arizona. Post-maternity roosts are typically transitory roosts used by adults and/or young bats in summer or fall (Fleming 1995). No roosts are known from within the primary burn area or the escaped fire contingency area, but Howell (1996) suggests that there are many potential roost sites in the Huachuca Mountains where hundreds of nectar feeding bats could roost without being detected. A lesser long-nosed bat banded at Wren Bridge on Fort Huachuca was found the next night at the Patagonia Bat Cave. Similar movements of bats from Patagonia Bat Cave to Empire Cienega and from the Manilla Mine to the Mustang Mountains have also been recorded. These long distance movements demonstrate that individuals of this species move relatively long distances and bats at roosts in the area are probably all part of a larger regional population (Yar Petryszyn, pers. comm., 1999, Sidner 1996, Howell 1996). At Fort Huachuca, roosting lesser long-nosed bats have been recorded from late July into October. Numbers of bats typically peak in early September (Sidner 1996).

Lesser long-nosed bats require suitable forage plants. At and near the project area, forage plants include Palmer's agave and possibly Parry's agave (the two are known to hybridize, as well.) The former species is most important for the lesser long-nosed bat at the lower elevations, such as in the project area. Agaves in grasslands and savannas have evolved with fire. They are typically found in open areas and slopes in lower sites and in forest openings at higher elevation. Invasion of mesquite, oak, and juniper into grassland areas as a result of reduced fire frequency may reduce potential habitat for agaves through shading. Alternatively, high fire frequency can lead to decline or elimination of agave populations (Howell 1996). Howell (1996) suggests that the natural fire frequency for agave areas on the South Range of Fort Huachuca is probably 10-15 years, with a range of 8-22 years. Fort Huachuca has adopted a policy of suppressing wildfire in their "Agave Management Areas" unless the area is approaching its natural fire return interval of 10 years, in which case a prescribed burn may take place.

EFFECTS OF THE PROPOSED ACTION

The lesser long-nosed bat is most sensitive to activities that might adversely affect roost sites. No known roosts occur in the action area, although small roost sites may be present (Howell 1996). Lesser long-nosed bats are not known to be present during February and March or in the fall when Phases 1 and 3 of the proposed action would be carried out. Most lesser long-nosed bats do not arrive in the Huachuca Mountains until late July or August, after Phase 2 is scheduled to be complete. Thus direct effects to lesser long-nosed bats are unlikely.

The prescribed fire may affect agaves, which are the primary forage plant for the lesser long-nosed bat in southeastern Arizona. Whether forage resources are limiting to lesser long-nosed bat populations in the Huachuca Mountains is unknown. Liz Slauson, working at several sites in southeastern Arizona, has never observed agave flowers drained of nectar, suggesting nectar availability is not limiting. However, the bats fly south in September or October at a time when blooming agaves are becoming less and less abundant, suggesting a waning food supply may be one of the factors that triggers migration. Yar Petryszyn (pers. comm. 1999) has observed apparent agonistic behavior of bats at agave flowers late in the season, suggesting possible competition for resources. If forage resources are limiting at times or certain places, we would expect that in some years or some areas, numbers of bats may be reduced, or bats may have to fly farther from their roosts to obtain sufficient resources, as a result of insufficient blooming agaves. Bats that fly greater distances are probably more vulnerable to predation or accidental death. Under a scenario of limiting food resources, damage or death of agaves due to prescribed fire could conceivably further reduce forage resources and bat numbers. Although the question of whether agaves are limiting to lesser long-nosed bats in the project area is unanswered, it seems likely that landscape-scale projects, such as a prescribed fire, that are adjacent to important roosts (which the Lone Mountain Fire is) will probably have some effects on bat foraging behavior, and some of these are likely to be adverse effects. The Service considers loss of forage resources a great enough threat to include protection of foraging areas and food plants as a priority 1 task in the lesser long-nosed bat recovery plan.

Mortality of leaf succulents exposed to fire is extremely variable. The Baker prescribed fire was conducted recently in the southern Peloncillo Mountains in extreme southeastern Arizona and southwestern New Mexico. According to preliminary monitoring efforts conducted after the fire, there was seven to 11 percent mortality of Palmer's agaves exposed to fire (Peter Warren, pers. comm. 1997). Additional mortality may accrue through loss of the smallest and least detectable size classes of agave. On the Maverick Prescribed Fire, also in the Peloncillo Mountains, less than five percent of agaves in burned areas were killed by the fire. Because of a mosaic of burned and unburned areas, overall mortality in the project area was perhaps less than one percent (T. Roller, Fish and Wildlife Service, Tucson, pers. comm. 1998). Thomas and Goodson (1992) reported an average mortality of 28 percent of five species of leaf succulents from nine burned sites in southern Arizona. Palmer's agave mortality averaged 18 percent. However, post-fire grazing may have influenced reported mortality. Concentrations of paniculate agaves are primarily on the rocky, shallow soils of hills and ridges, particularly on southerly and southeasterly facing slopes. Other Palmer's and Parry's agaves are found scattered in areas of deep, heavy soils where thick stands of shrubs and mesquite form heavy fuel loads. The relative fuel loading and potential exposure of agaves to intense fire is lower on rocky soils.

Agave mortality due to fire may affect the abundance and distribution of blooming agaves on the landscape for many years into the future, especially if there is high mortality within certain age/size classes (e.g seedlings). In addition, natural recruitment of agaves may be very episodic and the effects of fire on the agave seed bank in the soil are unknown. Often one of the objectives of prescribed fire is to increase abundance of grasses. Grasses are probably one of the strongest competitors with agave seedlings (Tony Burgess, pers. comm. 1997). Increased abundance of

grass could result in reduced agave abundance. Agave stalks, as they begin to bolt, are particularly palatable to domestic livestock and wild herbivores, including deer, javelina, rodents, and rabbits (Michelle Hawks, University of Arizona, Tucson, pers. comm. 1997; Wendy Hodgson, pers. comm. 1997). Since agaves often remain partially green, succulent, and available to herbivores when food resources are low immediately following a fire, they may be preferentially selected by herbivores. This may in turn affect the availability of agave flowering stalks to bats.

Besides direct mortality of agaves, fire may alter the availability of blooming agaves. By early spring, an agave plant would have physiologically committed to bolt (send up a flowering stalk). If the plant is burned and lives, bolting continues though the flower stalk is smaller with fewer flowers (Howell 1996; Liz Slauson, pers. comm. 1997). If the stalk burns directly, the reproductive effort of that plant and the availability of flowers and nectar to *Leptonycteris* has been lost. A fire may actually stimulate flowering in adult agaves 1-2 years following a burn (Liz Slauson pers. comm. 1997). However, in subsequent years following the period of increased flowering there may be a reduced number of flowering agaves. Although the availability of blooming agaves may be affected by fire, the nectar production and sugar content of surviving plants is little affected. Working in the Peloncillo Mountains, Slauson (pers. comm. 1997) found that nectar production and sugar content did not differ between unburned agaves and burned agaves that did not have greater than 80-90 percent of the leaf area burned The complexity of variables influencing agave flowering may mask the effects of a burn on agave flowering within several years of a fire.

Reintroducing fire into fire-adapted communities, such as desert grassland and oak/juniper savanna systems, can also have many benefits and may improve overall long-term "ecosystem management" objectives. Among these is the reduction of woody fuels resulting in decreased probability of intense fires and resulting erosion, soil sterilization, and increased plant mortality. Ultimately, if fire continues to be excluded from fire-adapted systems a major wildfire will occur with potentially devastating effects. Returning to a more natural regime of low-intensity fires would help to maintain a mosaic of grasslands, woodlands, and shrublands across the landscape and may enhance refugia in which fuel loads and the chances of damaging fires are low. However, even under a prescribed fire regime there are potential adverse effects of fire to forage plants that may affect resource availability for the lesser long-nosed bat.

Activities that directly or indirectly promote invasion or increased density of nonnative grasses, particularly Lehmann lovegrass, may result in increased fire frequency or intensity, reduced densities of Palmer's agave, and thus reduced forage resources for the lesser long-nosed bat. Lehmann lovegrass has been planted on the mesa tops in the project area in years past where it coexists with native grasses. Lehmann lovegrass does not appear to be spreading (U.S. Forest Service, Coronado National Forest 1998c). However, this species increases after fire (Ruyle *et al.* 1988, Sumrall *et al.* 1991, Martin 1983, Howell 1996), and produces an abundance of fine fuel that promotes hot fires (McPherson 1995). Thus, frequent fire is likely to increase the abundance of Lehmann lovegrass, and increased abundance of this grass will likely fuel more fires and hotter fires, creating a positive feedback loop (Anable *et al.* 1992). Frequent, hot fires brought about

by prescribed fires and increasing prevalence of Lehmann lovegrass will likely reduce densities of Palmer's agave. At Fort Huachuca, Howell (1996) found that Lehmann lovegrass creates areas of continuous fuels that burn at a constant temperature versus stands of native grasses that are patchy in regard to fuels and fire intensity. Agaves can persist in fire-prone native grasslands in bare areas or refugia that burn lightly or not at all. Such refugia are less common in Lehmann lovegrass stands. Howell (1996) also noted a negative relationship between the proportion of agave seedlings and ramets and the amount of Lehmann lovegrass. She suggested that Lehmann lovegrass appears to suppress agave recruitment independent of the fire effects just described. The mechanism of suppression is unclear, but Howell (1996) suggests Lehmann lovegrass may compete effectively with agaves for nutrients and/or light. If agave densities are reduced due to elevated fire effects or recruitment suppression caused by Lehmann lovegrass invasion, forage resources of the lesser long-nosed bat will be reduced.

The importance of Parry's agave stands in the Huachuca Mountains as a forage resource for the lesser long-nosed bat is unknown. As discussed, Parry's agave generally occurs at higher elevation than Palmer's agave, and occurs in forest openings throughout the Huachuca Mountains to the mountain's crest. Benson and Darrow (1982) note that it typically flowers in June and early July, which is before most lesser long-nosed bats arrive at roosts at Fort Huachuca. However, J. Rorabaugh (pers. comm. 1998) noted many Parry's agave in flower high in the Huachuca Mountains on the crest trail during late July in 1997. It may be that agaves at high elevation bloom later than at lower sites, and could potentially be blooming and be used as a forage resource when lesser long-nosed bats arrive in July or early August.

The only significant threat to stands of agaves in the forested portions of the Huachuca Mountains is wildfire. As discussed for the Huachuca water umbel, fuel loads are high in some portions of the Huachuca Mountains, and a stand-replacing, catastrophic wildfire could occur due to lightning strikes, a careless recreationist, or other causes. Because Parry's agave occurs primarily in openings and often on rocky slopes where fuel loads are relatively light, agave populations may not be severely directly affected by wildfire. Openings created by fire could conceivably increase habitat for agaves, temporarily. However, post-fire erosion of slopes could bury or scour hillsides and rocky places where Parry's agave occurs.

If the prescribed fire escapes containment, it would be suppressed as a wildlife. Suppression would be necessary to minimize or avoid loss of life, property, and adverse effects to habitats, including those of the lesser long-nosed bat. However, during suppression, activities could, in themselves, result in some adverse effects to the lesser long-nosed bat. Because of the distance between the project area and any known roosts (the closest roost is 5 miles to the southeast) it is highly unlikely that an escaped wildfire would affect a roost. However, additional agave areas could be burned, and suppression activities, such as creating fire lines, off-road vehicle activity, establishment of fire crew camps and equipment staging areas, igniting with drip torches if "burning out" is needed to control a fire, and the dropping of slurry, could all adversely affect individual agaves or agave habitat. Decisions made during fire suppression (i.e. which areas to protect first, placement of fire camps, fire lines, etc.) also may affect the extent and location of wildfire effects.

The Coronado did not address in their biological assessment grazing activities after the fire. The project would occur in the Lone Mountain allotment of the Sierra Vista Ranger District. Grazing immediately after a fire can retard recovery of grasses and other plants, and facilitate erosion of slopes through hoof action and reduced vegetation cover. Dan Robinett (Natural Resource Conservation Service, Tucson, Arizona, pers. comm. 1996) recommends resting burned sites above 4,000 feet from grazing for a 2 year period to facilitate recovery. In the Maverick Prescribed Fire, Peloncillo Mountains, the Coronado proposed resting the burned areas for two growing seasons (July, August, and September) following the fire.

Cumulative Effects

Cumulative effects are those adverse effects of future non-Federal (State, local government, and private) actions that are reasonably certain to occur in the project area. Future Federal actions would be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project. Effects of past Federal and private actions are considered in the Environmental Baseline. Much of the land in the project area is managed by Federal agencies, particularly the Coronado National Forest, Coronado National Memorial, and Fort Huachuca. The only significant lesser long-nosed bat roosts in the Huachuca Mountains are located on Federal lands. Activities on State and private lands may require permits or funding from Federal agencies. Thus, many of the actions that are reasonably expected to occur in the project area that may adversely affect the lesser long-nosed bat would be subject to section 7 consultations. However, grazing occurs on large tracts of private lands to the west of the project area and to the south in Sonora that are not subject to section 7. The effects of these activities are considered cumulative to proposed action. Development is also occurring at Sierra Vista and at the mouths of canyons on the east slope south of Fort Huachuca that is likely to result in destruction of bat foraging habitat and agaves. Compliance with the Act for activities on non-Federal lands that may affect the lesser long-nosed bat, but are not addressed by section 7 consultation, could occur through section 10(a)(1)(B) of the Act.

Effectiveness of Proposed Mitigation

As discussed in the Effects of the Proposed Action in regard to fire in agave management areas, the Service believes the relationships between fire frequency, intensity, and seasonality and agave population dynamics are complex. The Coronado proposes cool season burning in riparian canyons and the Scotia and Sunnyside canyon area. The risk of agaves mortality or damage is relatively low in these areas. There is greater potential for damage to agaves in portions of the project area proposed for Phase 2 (May/June fire). In these areas, measures including construction of waterbars in fire lines, avoidance of intense fire on sensitive soils, and retaining sufficient ground cover to prevent erosion will reduce the incidence of agave mortality or injury. Also, the purposes of the project, which include decreasing the likelihood of catastrophic stand-replacing fire, should help prevent erosion of hillsides and loss of agave habitat after wildfires.

CONCLUSION

After reviewing the current status of the lesser long-nosed bat, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of lesser long-nosed bat. No critical habitat has been designated for the lesser long-nosed bat; thus none will be affected. We present this conclusion for the following reasons:

1. The proponent's proposed action includes features to minimize take of lesser long-nosed bats and mitigate the direct and indirect impacts of the proposed action on the lesser long-nosed bat and its foraging habitats.

2. The project area in which most activities occur covers a relatively minor portion of the total range of the lesser long-nosed bat.

3. The proposed action is expected to result in reduced risk of catastrophic stand-replacing fire that could result in erosion and loss of habitat for agaves and forage resources for the lesser long-nosed bat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined in the same regulation by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take of a listed animal species that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, 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 Coronado National Forest so that they become binding conditions of any grant or permit issued to any applicant, permittee, or contractor, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Coronado has a continuing duty to regulate the activity covered by this incidental take statement. If the Coronado (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant, permittee, or contractor 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 Coronado must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service anticipates the following incidental take of lesser long-nosed bats as a result of the proposed action:

Ten lesser long-nosed bats as a result of harm due to loss of forage plants and their habitat as a result of prescribed fire.

Up to five lesser long-nosed bats due to loss or damage to forage plants and their habitat as a result of wildfire and wildfire suppression (if the fire escapes).

The Service believes take of lesser long-nosed bats will be difficult to detect for the following reason(s): the bat is wide-ranging and may use more than one roost; it has a small body size; thus finding a dead or injured individual is unlikely; losses may be masked by seasonal use of roosts; and the species occurs in habitats that makes detection difficult. Therefore, we have defined the following parameter, that in addition to the above numbers of bats, will be used as an indicator that anticipated incidental take has been exceeded.

> The fire burns more than 5,200 acres, or
> mortality of burned agaves exceeds 20 percent.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If the incidental take anticipated in the preceding paragraphs is met, the Coronado shall immediately notify the Service in writing. If, during the course of the action, the level of anticipated incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation. In the interim, the Coronado must cease the activity resulting in the take if it is determined that the impact of additional taking will cause an irreversible and adverse impact on the species. The Coronado must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures. This biological opinion does not authorize any form of take not incidental to the Coronado's proposed action as described herein.

EFFECT OF THE TAKE

In this biological opinion, the Service finds that this level of anticipated take is not likely to jeopardize the continued existence of the lesser long-nosed bat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take authorized by this biological opinion:

1) Defined project areas and well-defined operational procedures shall be implemented to reduce adverse effects to lesser long-nosed bat forage plants due to prescribed fire and (if needed) wildfire suppression.

2) The Coronado shall ensure that post-fire grazing does not impair the recovery of plant communities and bat forage resources.

3) The Coronado shall monitor incidental take resulting from the proposed action and report to the Service the findings of that monitoring.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Coronado must comply with the following terms and conditions in regards to the proposed action. These terms and conditions implement the reasonable and prudent measures described above. Terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure number one:

a. One of the objectives of the Lone Mountain Fire shall be protection of lesser long-nosed bat foraging habitats. This objective will not in any way constrain the fire boss from taking any action as needed to protect life or property.

b. The Coronado shall implement the proposed mitigation measures, as described in the proposed action.

c. No more than 20 percent of agaves that are burned during the proposed action are killed by the fire.

d. The Coronado shall examine concentrations of agaves in the proposed burn area and blackline or otherwise protect from fire, prior to initiating Phase 2, any significant concentrations of agaves that appear to be amidst fuel loads that could result in mortality greater than 20 percent. "Agave concentrations" are contiguous stands or concentrations of more than 100 plants. The Coronado shall use its best judgement, based on biological and fire expertise, to determine which significant agave stands are prone to mortality greater than 20 percent.

e. A Resource Advisor(s) shall be on the fire during all prescribed fire and suppression activities. Resource Advisors shall be qualified biologists designated to coordinate lesser long-nosed bat concerns and serve as an advisor to the fire boss. They shall also serve as field contact

representatives responsible for coordination with the Service. They shall monitor fire activities to ensure protective measures endorsed by the fire boss are implemented. Resource Advisors shall be on call 24 hours per day during all treatments.

f. Areas of significant human activity during fire activities (including any suppression), such as fire crew camps, landing strips, and equipment staging areas, shall be located to minimize as much as possible impacts to agaves and agave habitat. Such areas shall also be kept to the minimum area possible and shall be located in previously disturbed sites whenever possible..

g. Off-road vehicle activity during fire activities shall be kept to a minimum. Vehicles shall be parked as close to roads as possible, and vehicles shall use wide spots in roads or disturbed areas to turn around. If off-road travel is necessary during suppression activities, local fire-fighting units should go off-road first because of their prior knowledge of the area.

h. Use of tracked vehicles during fire activities shall be restricted to improving roads or constructing lines where a short distance of line might save a large area from fire.

i. The Coronado shall, to the extent possible, obliterate vehicle tracks made during fire activities, especially those of tracked vehicles.

j. Patches of unburned vegetation within burned areas shall not be burned out as a fire suppression measure, except as needed to secure the fire perimeter or provide for fire fighter safety.

k. If any lesser long-nosed bat roosts are located either in the primary burn area or in the escaped fire contingency area before completion of all phases of the project, the Coronado shall consider this new information, and in accordance with 50 CFR 402.16(b), the Coronado shall discuss with the Service whether reinitiation of consultation is warranted.

2. The following term and condition implements reasonable and prudent measure number two:

The Coronado shall rest burned areas from grazing for the first 2 summer growing seasons (July, August, and September) following implementation of the final phase of the fire, or such areas shall be rested until grass production has increased by 200 pounds per acre. No grazing during July, August, and September shall occur in burned areas between phases.

3. The following term and condition implements reasonable and prudent measure number three:

a. In the project area, the Coronado shall conduct monitoring of agave population density, survival, and flowering in accordance with a study design agreed upon by the Coronado and the Service. The objective of the monitoring shall be to establish trends in bat forage resources.

b. If the Coronado detects any take of the lesser long-nosed bat as a result of the proposed action, such take shall be documented. A brief report summarizing the results of such documentation, monitoring in part 3.a, acres burned and whether such fire burned outside of the primary burn

area, any suppression activities carried out to stop the fire, as well as implementation and effectiveness of these terms and conditions, shall be submitted to the Service in a monitoring report no later than six months after completion of all phases of the project. The report shall also make recommendations, as needed, for modifying or refining these terms and conditions to enhance protection or reduce needless hardship on the Coronado or its permittees/contractors.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the lesser long-nosed bat. In furtherance of the purposes of the Act, we recommend implementing the following actions:

1. The Coronado should investigate the importance of Parry's agave as a forage resource for the lesser long-nosed bat.

2. The Coronado should continue to investigate the fire ecology of paniculate agaves.

3. The Coronado should investigate and monitor the invasion of Lehmann lovegrass in the project area and assist other agencies in developing methods for controlling this nonnative grass.

4. The Coronado should fund comprehensive surveys for lesser long-nosed bat roosts on National Forest lands in the Huachuca Mountains.

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

(Note: Surveys for lesser long-nosed bats, or other bats, that involve capture or take require appropriate permits from the Service and Arizona Game and Fish Department.)

Sonora tiger salamander
STATUS OF THE SPECIES

The Sonora tiger salamander is a large salamander with a dark venter and light-colored blotches, bars, or reticulation on a dark background. Snout-vent lengths of metamorphosed terrestrial salamanders vary from approximately 2.6-4.9 inches (Jones *et al.* 1988, Lowe 1954). Larval salamanders are aquatic with plume-like gills and well-developed tail fins (Behler and King 1980). Larvae hatched in the spring are large enough to metamorphose into terrestrial salamanders from

late July to early September, but only an estimated 17 to 40 percent metamorphose annually. Remaining larvae mature into branchiates (aquatic and larval-like, but sexually mature salamanders that remain in the breeding pond) or over-winter as larvae (Collins and Jones 1987; James Collins, Arizona State University, pers. comm. 1993). The Sonora tiger salamander was listed as endangered on January 6, 1997. No critical habitat has been proposed or designated. A recovery plan is currently in preparation by Dr. James Collins and Jon Snyder, Arizona State University. A Participation Team of stakeholders and other individuals knowledgeable about the salamander and its habitat are assisting Dr. Collins and Mr. Snyder.

The Sonora tiger salamander is known from approximately 45 breeding localities (Jon Snyder, Arizona State University, pers. comm. 1999; Ziemba *et al.* 1998; Abbate 1998; US Fish and Wildlife Service 1997; Collins and Jones 1987; Collins 1996). Salamanders that may be Sonora tiger salamanders have also been found at the lower Peterson Ranch tank in Scotia Canyon, upper Garden Canyon Pond at Fort Huachuca, and at Los Fresnos in the San Rafael Valley, Sonora. Salamanders have not been found at the Scotia Canyon site for several years: this population may be extirpated. Additional reports of the salamander from one mine, one cave, and one spring-fed well have yet to be confirmed (Ziemba *et al.* 1998). All sites where Sonora tiger salamanders have been found are located in the Santa Cruz and San Pedro river drainages, including sites in the San Rafael Valley and adjacent portions of the Patagonia and Huachuca mountains in Santa Cruz and Cochise counties, Arizona. All confirmed historical and extant aquatic populations are found in cattle tanks or impounded cienegas within 19 miles of Lochiel, Arizona. During intensive surveys in 1997, from one to 150 Sonora tiger salamanders were found at 25 stock tanks (Abbate 1998). Populations and habitats are dynamic, thus the number and location of extant aquatic populations changes over time, as exhibited by the differences between survey results in 1985 and 1993-1997 (Ziemba *et al.* 1998, Abbatte 1998, Collins and Jones 1987, Collins 1996; James Collins, pers. comm. 1996).

Historically, the Sonora tiger salamander probably inhabited springs, cienegas, and possibly backwater pools that were extant long enough to support breeding and metamorphosis (at least two months), but ideally were permanent or nearly permanent, allowing survival of mature branchiates. The grassland community of the San Rafael Valley and adjacent montane slopes, where all extant populations of Sonora tiger salamander occur, may represent a relictual grassland and a refugium for grassland species. Tiger salamanders in this area became isolated and, over time, genetically distinct from ancestral *A. t. mavortium* and *A. t. nebulosum* (Jones *et al.* 1995). This subspecies has opportunistically taken advantage of available stock tank habitats as natural habitats disappeared (Hendrickson and Minckley 1984) or were invaded by nonnative predators with which the salamander can not coexist (US Fish and Wildlife Service 1997).

Primary threats to the salamander include predation by nonnative fish and bullfrogs, a disease, catastrophic floods and drought, illegal collecting, introduction of other subspecies of salamanders that could genetically swamp *A. t. stebbinsi* populations, and stochastic extirpations or extinction characteristic of small populations with low genetic variability. Predation by catfish, bass, mosquito fish, and sunfish can eliminate stock tank populations of Sonora tiger salamander (Jonathan Snyder, Arizona State University, pers. comm. 1996; Collins *et al.* 1988). The

salamanders can apparently coexist with bullfrogs, but bullfrogs prey on salamanders (J, Snyder, pers. comm. 1996) and perhaps if they are present in sufficient densities could reduce or eliminate salamander populations. Tadpoles of wood frogs, *Rana sylvatica*, are known to feed on spotted salamander, *Ambystoma maculatum*, eggs (Petranka *et al.* 1998), but under experimental conditions bullfrog tadpoles do not feed on viable salamander eggs or hatchlings (Collins 1996, J. Collins, pers. comm. 1996). A disease, recently identified as an iridiovirus, has been documented at numerous tanks in the San Rafael Valley (Jancovich *et al.* 1998). Once introduced to a stock tank, most or all aquatic salamanders die (Collins *et al.* 1988, Jancovich *et al.* 1998). The disease may be spread by birds, cattle, or other animals that move among tanks (Jancovich *et al.* 1998). The disease could also be spread by researchers if equipment such as waders and nets used at a salamander tank are not disinfected or allowed to thoroughly dry before use at another tank. Diseased salamanders were found at two tanks in 1997 (Abbate 1998).

Ambystoma tigrinum mavortium or *stebbinsiXmavortium* crosses have recently been confirmed for the first time at two stock tanks in the San Rafael Valley (Ziemba *et al.* 1998). Thus, genetic swamping of *stebbinsi* populations may be underway. With the exception of Bog Hole in the San Rafael Valley and a site on Fort Huachuca, cattle grazing occurs throughout the range of the Sonora tiger salamander. Cattle can trample salamanders and their eggs, and can degrade habitat at stock tank breeding sites. Overgrazing can cause loss of cover and erosion that can threaten the integrity of stock tanks used by the salamander. Genetic analysis suggests very little genetic variability in Sonora tiger salamanders (Jones *et al.* 1988, Jones *et al.* 1995, Ziemba *et al.* 1998). In populations with low genetic variability lethal alleles are more likely to be expressed, disease resistence may be low, and evolution and adaptation to a changing environment is relatively slow.

For further information on the ecology, taxonomy, range, and threats to this subspecies, refer to Collins (1981, 1996), Collins and Jones (1987),Collins *et al.* (1988), Gelhbach (1967), Jancovich *et al.* (1998), Jones *et al.* (1988,1995), Lowe (1954), Snyder *et al.* (1996, 1998), and Ziemba *et al.* 1998.

ENVIRONMENTAL BASELINE

The biological assessment identifies two tanks within the primary burn area (Joaquin Tank and Hannah's Tank [referred to as an unnamed tank in U.S. Forest Service. Coronado National Forest 1998a]), and three tanks within the escaped fire contingency zone (Mesa [Encino Vista] Tank, Doggie (Whiner) Tank, and Upper Mesa tank (referred to as an unnamed tank in U.S. Forest Service, Coronado National Forest 1998a) that support or have supported Sonora tiger salamanders. Fish and Wildlife Service records also show that Cadie Tank is located within the primary burn area, Out-of-the-way Tank is located in the escaped fire contingency zone, and Water Tank Tank and Chamisa Tank are located immediately downstream of the escaped fire contingency zone. All of these tanks currently support or have supported Sonora tiger salamanders in the last 5 years, with the exception of Joaquin Tank, for which data is lacking. Fish were not found in these tanks in 1998 (no data for Joaquin Tank). Any tanks in the project area that hold water for more than two months in the spring and are free of fish should be considered potential breeding habitat for the Sonora tiger salamander. Collins (1996) found the

largest and most robust populations of the Sonora tiger salamander in the southeastern portion of the San Rafael Valley, in the vicinity and south/southwest of the project area.

Threats to Sonora tiger salamander in the project area include erosion, sedimentation, and smoke or ash toxicity due to wildfire, prescribed fire, managed natural fire, and fire suppression activities; death or injury of salamanders due to off-road vehicles illegally driving through tanks; trampling of salamanders and destruction of vegetation cover by livestock at and near stock tanks; illegal collection of salamanders for bait or other purposes; and introduction of nonnative fish, bullfrogs, or other subspecies of salamanders to Sonora tiger salamander habitat that may prey upon or spread disease to Sonora tiger salamanders, and in the case of other subspecies, interbreed with and cause genetic swamping of Sonora tiger salamander populations. Crayfish are present in upper Garden Canyon Pond on the western edge of Fort Huachuca and in Bear Canyon, but they have not been detected in Sonora tiger salamander habitats in the San Rafael Valley. If crayfish spread to salamander habitats, they too would likely prey on salamander larvae and eggs.

EFFECTS OF THE PROPOSED ACTION

We are not aware of any studies that evaluated the effects of fire on salamanders. However, fire could potentially result in direct death or injury of salamanders, and reduced habitat quality or quantity. Degradation of watershed condition immediately after fires can result in dramatically increased runoff, sedimentation, and debris flow that can scour aquatic habitats in canyon bottoms or bury them in debris (DeBano and Neary 1996). In degraded watersheds, less precipitation is captured and stored, thus perennial aquatic systems downstream may become ephemeral during dry seasons or drought (Rinne and Neary 1996). Fire could result in degradation of the immediate watershed around a pond, and result in erosion, sedimentation, and ash flow into the pond. Although effects on salamanders are unknown, in salmonid fish, ash and slurry flow into streams can be toxic and populations of macroinvertebrates (salamander prey species) can be drastically reduced after a fire (Rinne 1996), at least temporarily (Roby and Azuma 1995). Smoke diffusion into water and ash flow can result in high levels of phosphorus and nitrogen (Spencer and Hauer 1991) with unknown effects to salamanders.

James Petranka (University of North Carolina at Ashville, pers. comm. 1998) notes that fire can be detrimental to plethodontid salamanders by eliminating ground cover and associated invertebrates that are key food sources. Mike Lanoo (Indiana University School of Medicine, Muncie, pers. comm. 1998) has never observed any direct effects to tiger salamanders as a result of summer fires in Indiana prairies, but he has noted reduced invertebrate populations in high sediment habitats that resulted in lower food availability for salamanders. In this case, a red-leg (a bacterial infection) outbreak occurred. Dr. Lanoo suspected that ash flow into a pond could cause the same result.

Siltation of a pond due to erosion and runoff following a fire could eliminate habitat. However, the effects of siltation may also be more subtle. Lefcort *et al.*(1997) examined the effects of silt on growth and metamorphosis of larval mole salamanders, *Ambystoma opaceum* and *A. tigrinum tigrinum*. Salamanders in silty water grew more slowly, metamorphosed sooner, and were more

susceptible to infection by a water mold, *Saprolegnia parasitica*, than salamanders in non-silty water.

Little is known about where adult terrestrial Sonora tiger salamanders go when not at the breeding ponds. Unlike some salamanders, terrestrial Sonora tiger salamanders are virtually never encountered on the surface, except at or in the immediate vicinity of breeding ponds. However, a Sonora tiger salamander was captured in a pit fall trap at Oak Spring in Copper Canyon, Huachuca Mountains, by Arizona Game and Fish Department personnel. The nearest known breeding site is approximately 0.6 mile to the south, suggesting the salamander may have moved at least that far. Capture in a pit fall trap also confirms that the individual was surface active. In other subspecies of *Ambystoma tigrinum*, metamorphs may disperse hundreds of meters from the breeding pond, or may remain nearby (Petranka 1998, Gelbach *et al.* 1969). Of hundreds of marked *Ambystoma tigrinum nebulosum,* two were found to move from 0.9-1.2 miles to new ponds (J. Collins, pers. comm. 1998). On Fort Huachuca, Sheridan Stone (pers. comm. 1998) reports finding terrestrial tiger salamanders (probably *A. t. mavortium*) 1.9-2.5 miles from the nearest known breeding pond. Referring to conservation of the California tiger salamander, *A. californiense*, Petranka (1998) finds that based on studies of movements of other *Ambystoma* species, conservation of a 650-1,650 foot radius of natural vegetation around a breeding pond would protect the habitat of most of the adult terrestrial population. Adults of western subspecies of *A. tigrinum* typically live in or about mammal burrows (Petranka 1998), although metamorphs may construct their own burrows, as well (Gruberg and Stirling 1972, Semlitsch 1983). Some species of salamanders exhibit seasonal migrations of up to several miles each way from breeding sites to upland habitats (Stebbins and Cohen 1995). If such migrations occur in the Sonora tiger salamander, we have no information about migration corridors or non-breeding habitat. Because of the arid nature of the environments in this region, if salamanders move very far from breeding ponds, they may use wet canyon bottoms, such as Scotia, Bear, and Sunnyside canyons, as movement corridors.

Possibly the greatest threat to the non-breeding terrestrial salamander population is fire. Erosion and increased runoff could bury or flood burrows, burrow entrances, rock shelters, or other cover sites. Fire may also reduce surface cover such as logs and debris, resulting in reduced invertebrate populations and reduced prey densities for salamanders (James Petranka, University of North Carolina, Asheville, pers. comm. 1998). Reduced cover may also result in heating and dessication of moist cover sites that salamanders require. Although the proposed action is expected to result in many of these adverse effects, the canyons where the occupied stock tanks occur and areas immediately upstream of the tanks are generally in areas that would be treated with cool season fire. Cool season fire is not expected have dramatic effects on the watersheds of these tanks. Cadie and Joaquin tanks are located in the Joaquin Canyon drainage that would be treated during Phase 1 (February-March). Upper Mesa Tank, is in the Sunnyside Canyon drainage, downstream of the primary burn area. This drainage would also be treated during Phase 1. Hannah's Tank is between Scotia and Merritt canyons, an area that would be treated in Phase 3 (Spring or Fall). Encino Vista and Whiner tanks are located in the escaped fire contingency zone in a drainage immediately west of Joaquin Canyon. That drainage appears to originate largely outside of the primary burn and thus is unlikely to be affected. Out of the Way tank and

Chamisa tank are also in drainages that appear to originate just outside of the primary burn. Water Tank Tank is in the same drainage as Encino Vista and Whiner tanks, but is farther (>1 mile) from the primary burn area. Thus, tanks where Sonora tiger salamanders are known to occur would either be within or downstream of areas to be treated with cool season fire (four tanks), or are located in areas that are not likely to be affected (five tanks). One of the purposes of the prescribed fire is to reduce the chance of catastrophic fire. Catastrophic fire that destroys mature stands of trees, sterilizes soil, and results in severe erosion and sedimentation is a serious threat to the salamander and its breeding habitat. Thus, although there are likely to be some short-term adverse effects, in the long-term the salamander is likely to benefit because the project would reduce the chance of catastrophic fire.

If the fire spreads outside of the primary burn area, fire suppression activities could affect salamanders or their habitat. Most importantly, during fire suppression helicopters are sometimes used to scoop water from ponds or lakes and then drop that water on the fire. Ponds that are depleted from such operations are often refilled from a nearby large lake or reservoir. If that occurred in the project area, aquatic salamanders could be scooped out of a tank and dropped on the fire. If a tank was refilled from Parker Canyon Lake (a likely source of water for refilling tanks), nonnative predaceous fish or bullfrog tadpoles could be introduced with deleterious effects described above in the Status of the Species. In accordance with terms and conditions in the Service's December 19, 1997, biological and conference opinion on the Land and Resource Management Plans, as Amended, for Eleven National Forests and National Grasslands in the Southwestern Region, the Coronado is required to limit use of water for fire suppression to tanks that are not occupied by the salamander, except in emergency situations to abate immediate fire threats to life or property. The same biological opinion requires that if tanks are refilled, they shall not be refilled with water from Parker Canyon Lake or other sources of water that may support fish, salamanders, or bullfrogs.

Establishment of fire crew camps, equipment staging areas, and landing strips; use of off-road vehicles, particularly tracked vehicles; and creation of fire lines during prescribed fire or fire suppression could all result in direct mortality of terrestrial Sonora tiger salamanders. Salamanders could be killed if active on the surface or may be crushed in shallow burrows, or they could be harmed if habitat was degraded. If Petranka's (1998) estimate of a 650-1,650 foot radius around breeding sites is accurate as the area where most terrestrial tiger salamanders occur, then limiting such activities within 1,650 feet of occupied stock tanks would limit take of Sonora tiger salamanders.

Routes created or enhanced during fire suppression activities could facilitate public access to breeding sites. Increased recreational use of breeding sites could result in introduction of nonnative fish or bullfrogs by anglers, and collection and relocation of salamanders. Relocation of aquatic organisms could also facilitate spread of the iridiovirus that regularly decimates aquatic populations of salamanders. The disease could also be spread by anglers via waders, tackle or other equipment used at a pond where the disease is present and then using that same wet or muddy equipment at another occupied tank. Off-road vehicle enthusiasts also enjoy the challenge of driving through or on the edge of stock tanks, which may result in disease transmission,

crushing of salamanders or eggs, and increased turbidity with associated effects discussed above and by Lefcort *et al.* (1997).

If aquatic populations of salamanders are eliminated due to disease, ash flow, increased turbidity, or collection, but the habitat remains suitable (i.e. the tank is not silted in or erodes away, and fish are not introduced), the tank is likely to be recolonized by terrestrial salamanders. As a result, effects of the action that result in destruction of breeding sites or introduction of nonnative predators are much more serious to the viability of the species than death or injury of individuals.

The Coronado did not address in their biological assessment grazing activities after the fire. The project would occur in the Lone Mountain allotment of the Sierra Vista Ranger District. Grazing immediately after a fire can retard recovery of grasses and other plants, and facilitate erosion of slopes through hoof action and reduced vegetation cover. Erosion in the watersheds of occupied breeding sites could contribute to sedimentation or erosion of tanks and loss of habitat. Dan Robinett (Natural Resource Conservation Service, Tucson, Arizona, pers. comm. 1996) recommends resting burned sites above 4,000 feet from grazing for a 2 year period to facilitate recovery. In the Maverick Prescribed Fire, Peloncillo Mountains, the Coronado proposed resting the burned areas for two growing seasons (July, August, and September) following the fire.

Effectiveness of Proposed Mitigation

The Coronado proposes a number of mitigating measures that reduce potential adverse effects to the salamander and its habitat. The most important measure is proposed cool season burning in canyons containing salamander breeding sites. Potential for erosion or sedimentation at the tanks, or ash flow into the tanks is minimized by use of cool season fire in these areas. Construction of waterbars in fire lines, avoidance of intense fire on sensitive soils, and retaining sufficient ground cover to prevent erosion will further reduce possible adverse effects to the salamander and its habitat. Also, the purposes of the project, which include decreasing the likelihood of catastrophic stand-replacing fire, should help reduce potential habitat damage from future wildfires.

CONCLUSION

After reviewing the current status of the Sonora tiger salamander, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Sonora tiger salamander. No critical habitat is designated for this species, thus none will be affected. Our conclusion of "no jeopardy" is based on the following:

1. Although some short-term adverse effects are anticipated, in the long-term the proposed action is likely to benefit the salamander and its habitat because the likelihood of catastrophic fire would be reduced.

2. The Coronado proposes a number of mitigating measures that reduce the likelihood and expected severity of adverse effects.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined in the same regulation by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take of a listed animal species that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, 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 Coronado so that they become binding conditions of any grant or permit issued to any applicant, permittee, or contractor, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Coronado has a continuing duty to regulate the activity covered by this incidental take statement. If the Coronado (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant, permittee, or contractor 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 Coronado must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Take of Sonora tiger salamander could occur in the form of harm, harassment, injury, or death resulting from 1) prescribed fire or escaped prescribed fire and subsequent direct effects to salamanders or effects to habitat that harm salamanders, 2) decisions made during fire suppression, 3) facilitating public access to breeding sites and subsequent collection or translocation of salamanders, spread of nonnative predators, spread of disease, and crushing or harm of salamanders resulting from increased off-road vehicle activity at tanks. Take of Sonora tiger salamanders will be difficult to quantify because the source of introduced predators, the cause of collection, contribution of the fire to sedimentation or erosion of tanks, and finding salamanders killed as a result of the fire or fire activities will often be difficult to estimate and dead salamanders are expected to be quickly scavenged or will be otherwise difficult to detect.

However, the Service anticipates loss of a portion of, or an entire aquatic population of Sonora tiger salamanders at one of the nine occupied tanks in or near the project site. Take of an additional 15 salamanders or eggs is anticipated at one or more tanks each due to the three causes listed above.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If the incidental take anticipated in the preceding paragraph is met, the Coronado shall immediately notify the Service in writing. If, during the course of the action, the level of anticipated incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation. In the interim, the Coronado must cease the activity resulting in the take if it is determined that the impact of additional taking will cause an irreversible and adverse impact on the species. The Coronado must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures. This biological opinion does not authorize any form of take not incidental to implementation of the proposed action as described in this opinion and in U.S. Forest Service, Coronado National Forest (1998a). Note that this opinion anticipates but does not authorize take of Sonora tiger salamander due to illegal activities such as illegal transport and release of fish or salamanders, capture of Sonora tiger salamanders, and off-road vehicle activity.

EFFECT OF THE TAKE

The Service has determined that the level of anticipated take is not likely to jeopardize the continued existence of the Sonora tiger salamander. If an entire aquatic population was lost due to the project, the tank would likely be recolonized as terrestrial salamanders returned to breed. The likelihood of the aquatic population being eliminated is greatly reduced by the reasonable and prudent measures and terms and conditions.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Sonora tiger salamander:

1. Implementation of proposed mitigation measures.

2. Measures to reduce the likelihood of take associated with illegal activities.

3. Measures to minimize the potential for take associated with prescribed fire and any needed fire suppression activities that are in addition to those proposed by the Coronado.

4. Measures to reduce effects of grazing in burned areas and subsequent adverse effects to the watersheds in which salamander breeding sites occur.

5. Monitoring of incidental take resulting from the proposed action and reporting to the Service the findings of that monitoring.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Coronado must comply with the following terms and conditions in regards to the proposed action. These terms and conditions implement the reasonable and prudent measures described above. Terms and conditions are nondiscretionary.

1. The following terms and conditions implement reasonable and prudent measure number 1:

a. The Coronado shall implement the proposed mitigation measures described under the "Description of the Proposed Action" herein.

2. The following terms and conditions implement reasonable and prudent measure #2:

a. During the prescribed fire or any needed suppression activities, the Coronado shall limit off-road vehicle activity and creation of new routes of travel to or in the vicinity of occupied salamander breeding sites. Creation of new access routes shall be limited to those needed for suppression activities and only where other alternatives are not available.

b. Any routes to or in the vicinity of salamander breeding sites created during fire activities shall be obliterated or made impassable after the fire is out to prevent further use by the public.

3. The following terms and conditions implement reasonable and prudent measure #3. Measures d. through g. apply only within the watersheds of the nine salamander breeding sites discussed in the "Effects of the Proposed Action".

a. One of the objectives of prescribed fire and needed fire suppression activities shall be protection of salamanders and salamander breeding sites. This objective will not in any way constrain the fire boss from taking any action as needed to protect life or property.

b. A Resource Advisor(s) shall be on the fire during all, prescribed fire or suppression activities. Resource Advisors shall be qualified biologists designated to coordinate Sonora tiger salamander concerns and serve as an advisor to the fire boss. They shall also serve as field contact representatives responsible for coordination with the Service. They shall monitor fire activities to ensure protective measures endorsed by the fire boss are implemented. Resource Advisors shall be on call 24 hours.

c. Areas of significant human activity during fire operations, such as fire crew camps, landing strips, and equipment staging areas, shall not be located on or adjacent to salamander breeding sites and shall be located at least 1,650 feet away from such sites unless absolutely necessary for

fire suppression. Such areas of human activities shall also be kept to the minimum area possible and shall be located in previously disturbed sites whenever possible.

d. Off-road vehicle activity during fire activities shall be kept to a minimum. Vehicles shall be parked as close to roads as possible, and vehicles shall use wide spots in roads or disturbed areas to turn around. If off-road travel is necessary during suppression, local fire-fighting units should go off-road first because of their prior knowledge of the area.

e. Use of tracked vehicles during fire activities shall be restricted to improving roads or constructing lines where a short distance of line might save a large area from fire.

f. Patches of unburned vegetation within burned areas shall not be burned out as a fire suppression measure, except as needed to secure the fire perimeter or provide for fire fighter safety.

g. The Coronado shall, to the extent possible, obliterate vehicle tracks made during fire activities, especially those of tracked vehicles.

2. The following term and condition implements reasonable and prudent measure number two:

Within the watersheds of the nine salamander breeding sites discussed in the "Effects of the Proposed Action", the Coronado shall rest burned areas from grazing for the first two summer growing seasons (July, August, and September) following implementation of the final phase of the fire, or such areas shall be rested until grass production has increased by 200 pounds per acre. No grazing during July, August, and September shall occur in burned areas between phases.

5. The following term and condition implements reasonable and prudent measure #4:

The Coronado shall monitor take of Sonora tiger salamanders and document any disturbance of salamanders or salamander habitat. A brief report to include a summary of the results of such monitoring/documentation, and a brief description of implementation and the effectiveness of these terms and conditions, shall be submitted to the Service in an annual monitoring report by January 31 of each year beginning in 1999. These reports shall also make recommendations, as needed, for modifying or refining these terms and conditions to enhance protection of the Sonora tiger salamander or reduce needless hardship on the Coronado or its contractors.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the Sonora

tiger salamander. In furtherance of the purposes of the Act, we recommend implementing the following actions:

1) The Coronado should study the movements and habitat use of terrestrial salamanders in and near the project area.

2) The Coronado should continue to actively participate in the preparation of the Sonora tiger salamander recovery plan.

3) If the Sonora tiger salamander is found breeding at sites that are likely to be adversely affected by the project other than the nine sites discussed in the "Effects of the Proposed Action", the Coronado should, in accordance with 50 CFR 402.16(b), reinitiate this consultation, as the Service believes this would represent new information revealing that the effects of the action may affect the salamander in a manner or to an extent not considered herein.

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

(Note: Surveys for Sonora tiger salamander that involve capture or take require appropriate permits from the Service and Arizona Game and Fish Department.)

DISPOSITION OF DEAD OR INJURED LISTED ANIMALS

Upon locating a dead or injured threatened or endangered animal, initial notification must be made to the Service's Division of Law Enforcement, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (602/261-6443) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animal species shall be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution prior to implementation of the action. Injured animals should be transported to a qualified veterinarian by a qualified biologist. Should any treated listed animal survive, the Service should be contacted regarding the final disposition of the animal.

CONCURRENCE

Mexican spotted owl
STATUS OF THE SPECIES

The Mexican spotted owl was listed as threatened on March 16, 1993 (58 FR 14248). Critical habitat was designated for the species on June 6, 1995 (60 FR 29914), but was withdrawn in a recent Federal Register notice (63 FR 14378). The Mexican spotted owl was originally described from a specimen collected at Mount Tancitaro, Michoacan, Mexico, and named *Syrnium occidentale lucidum*. The spotted owl was later assigned to the genus *Strix*. Specific and subspecific names were changed to conform to taxonomic standards and the subspecies became *S. o. lucida*. The American Ornithologists' Union currently recognizes three spotted owl subspecies, including the California, *S. o. occidentalis*; Mexican, *S. o. lucida*; and Northern, *S. o. caurina*. The Mexican spotted owl is mottled in appearance with irregular white and brown spots on its abdomen, back, and head. The spots of the Mexican spotted owl are larger and more numerous than in the other two subspecies giving it a lighter appearance. Several thin white bands mark an otherwise brown tail. Unlike most owls, spotted owls have dark eyes.

The Mexican spotted owl is distinguished from the California and northern subspecies chiefly by geographic distribution and plumage. The Mexican spotted owl has the largest geographic range of the three subspecies. The range extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah southward through Arizona and New Mexico and, discontinuously through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau. There are no estimates of the owl's historic population size. Its historic range and present distribution are thought to be similar.

Using starch-gel electrophoresis to examine genetic variability among the three subspecies of spotted owls, Barrowclough and Gutierrez (1990) found the Mexican spotted owl to be distinguishable from the other two subspecies by a significant variation, which suggests prolonged geographic isolation of the Mexican subspecies and indicates that the Mexican spotted owl may represent a species distinct from the California and Northern spotted owls.

The current known range of the Mexican spotted owl extends north from Aguascalientes, Mexico through the mountains of Arizona, New Mexico, and western Texas, to the canyons of southern Utah and southwestern Colorado, and the Front Range of central Colorado. Although this range covers a broad area of the southwestern United States and Mexico, much remains unknown about the species' distribution within this range. This is especially true in Mexico where much of the owl's range has not been surveyed. Information gaps also appear for the species' distribution within the United States. It is apparent that the owl occupies a fragmented distribution throughout its United States range corresponding to the availability of forested mountains and canyons, and in some cases, rocky canyon lands.

The primary administrator of lands supporting owls in the United States is the US Forest Service. According to the Mexican Spotted Owl Recovery Plan (US Fish and Wildlife Service 1995), 91

percent of owls known to exist in the United States between 1990 and 1993 occurred on lands administered by the Forest Service. The majority of known owls have been found within Region 3 of the Forest Service, which includes 11 National Forests in New Mexico and Arizona. Forest Service Regions 2 and 4, including two national forests in Colorado and three in Utah, support fewer owls.

A reliable estimate of the numbers of owls throughout its entire range is not currently available due to limited information. Owl surveys conducted from 1990 through 1993 indicate that the species persists in most locations reported prior to 1989, with the exception of riparian habitats in the lowlands of Arizona and New Mexico, and all previously occupied areas in the southern states of Mexico. Increased survey efforts have resulted in additional sightings for all recovery units. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico in 1990 using information gathered by Region 3 of the Forest Service. Fletcher's calculations were modified by the US Fish and Wildlife Service (1991), who estimated that there were a total of 2,160 owls in the United States. While the number of owls throughout its range is currently not available, the Recovery Plan reports an estimate of owl sites based on 1990 - 1993 data. An owl "site" is defined as "a visual sighting of at least one adult owl or a minimum of two auditory detections in the same vicinity in the same year." Surveys from 1990 through 1993 indicate one or more owls have been observed at a minimum of 758 sites in the United States and 19 sites in Mexico. At best, total numbers in the United States range from 777 individuals, assuming each known site was occupied by a single owl, to 1,554 individuals, assuming each known site was occupied by a pair of owls.

Past, current, and future timber-harvest practices in Region 3 of the Forest Service, in addition to catastrophic wildfire, were cited as the primary factors leading to listing of the spotted owl as a threatened species. Fletcher (1990) estimates that 1,037,000 acres of habitat were converted from suitable (providing all requirements of the owl, e.g., nesting, roosting, and foraging) to capable (once suitable, but no longer so). Of this, about 78.7 percent, or 816,000 acres, was a result of human management activities, whereas the remainder was converted more or less naturally, primarily by wildfire. Other factors which have or may lead to the decline of this species include a lack of adequate regulatory mechanisms.

Mexican spotted owls breed sporadically and do not nest every year. Mexican spotted owl reproductive chronology varies somewhat across the range of the owl. In Arizona, courtship apparently begins in March with pairs roosting together during the day and calling to each other at dusk (Ganey 1988). Eggs are laid in late March or, more typically, early April. Incubation begins shortly after the first egg is laid, and is performed entirely by the female (Ganey 1988). The incubation period for the Mexican spotted owl is assumed to be 30 days (Ganey 1988). During incubation and the first half of the brooding period, the female leaves the nest only to defecate, regurgitate pellets, or to receive prey from the male, who does all or most of the foraging (Forsman *et al.* 1984, Ganey 1988). Eggs usually hatch in early May, with nestling owls fledging four to five weeks latter, and then dispersing in mid September to early October (Ganey 1988).

Little is known about the reproductive output of the spotted owl. It varies both spatially and temporally (White *et al.* 1995), but the subspecies demonstrates an average annual rate of 1.001 young per pair. There is inadequate data at this time to estimate population trend. Little confidence in initial estimates has been expressed, and is due to its reliance on juvenile survival rates which are believed to be biased low, and due to the insufficient time period over which studies have been conducted.

Based on short-term population and radio-tracking studies, and longer-term monitoring studies, the probability of an adult Mexican spotted owl surviving from one year to the next is 0.8 to 0.9. Juvenile survival is considerably lower at 0.06 to 0.29, although it is believed these estimates may be artificially low due to the high likelihood of permanent dispersal from the study area and the lag of several years before marked juveniles reappear as territory holders and are detected as survivors through recapture efforts (White *et al.* 1995). Little research has been conducted on the causes of mortality of the spotted owl, but predation by great horned owls, northern goshawks, red-tailed hawks, and golden eagles; starvation; and accidents or collisions may all be contributing factors.

Mexican spotted owls nest, roost, forage, and disperse in a diverse array of biotic communities. Nesting habitat is typically in areas with complex forest structure or rocky canyons, and contain mature or old-growth stands which are uneven-aged, multi-storied, and have high canopy closure (Ganey and Balda 1989, US Fish and Wildlife Service 1991). In the northern portion of the range (southern Utah and Colorado), most nests are in caves or on cliff ledges in steep-walled canyons. Elsewhere, the majority of nests appear to be in Douglas-fir trees (Fletcher and Hollis 1994, Seamans and Gutierrez 1995). A wider variety of tree species is used for roosting; however, Douglas-fir is the most commonly used species (Ganey 1988, Fletcher and Hollis 1994). Foraging owls use a wider variety of forest conditions than for nesting or roosting. In northern Arizona, owls generally foraged slightly more than expected in unlogged forests, and less so in selectively logged forests (Ganey and Balda 1994). However, patterns of habitat use varied among study areas and individual birds, making generalizations difficult.

Seasonal movement patterns of Mexican spotted owls are variable. Some individuals are year-round residents within an area, some remain in the same general area but show shifts in habitat-use patterns, and some migrate considerable distances (20-50 kilometers / 12-31 miles) during the winter, generally migrating to more open habitats at lower elevations (Ganey and Balda 1989, Ganey *et al.* 1998). Home-range size of Mexican spotted owls appears to vary considerably among habitats and/or geographic areas, ranging in size from 261 to 1,487 hectares for individual birds, and 381 to 1,551 hectares for pairs (Ganey and Balda 1989). Little is known about habitat use by juveniles during natal dispersal. Ganey *et al.* (1998) found dispersing juveniles in a variety of habitats ranging from high-elevation forests to pinyon-juniper woodlands and riparian areas surrounded by desert grasslands. Some juveniles remained in forests similar to typical owl breeding habitat.

Mexican spotted owls consume a variety of prey throughout their range but commonly eat small and medium sized rodents such as woodrats, *Neotoma* spp., peromyscid mice, and microtine

voles. They may also consume bats, birds, reptiles, and arthropods (Ward and Block 1995). Habitat correlates of the owl's common prey emphasizes that each prey species uses a unique microhabitat. Deer mice, *Peromyscus maniculatus,* are ubiquitous in distribution in comparison to brush mice, *Peromyscus boylei*, which are restricted to drier, rockier substrates, with sparse tree cover. Mexican woodrats, *N. mexicana*, are typically found in areas with considerable shrub or understory tree cover and high log volumes or rocky outcrops. Mexican voles, *Micotus mexicanus*, are associated with high herbaceous cover, primarily grasses; whereas, long-tailed voles, *M. longicaudus,* are found in dense herbaceous cover, primarily forbs, with many shrubs, and limited tree cover. A diverse prey base is dependant on the availability and quality of diverse habitats.

The Mexican Spotted Owl Recovery Plan (US Fish and Wildlife Service 1995) provides for three levels of habitat management: protected areas, restricted areas, and other forest and woodland types. "Protected habitat" includes all known owl sites, and all areas in mixed conifer or pine-oak forests with slopes >40% where timber harvest has not occurred in the past 20 years, and all reserved lands. "Protected Activity Centers" (PACs) are delineated around known Mexican spotted owl sites. A PAC includes a minimum of 243 hectares (600 acres) designed to include the best nesting and roosting habitat in the area. The recommended size for a PAC includes, on average from available data, 75% of the foraging area of an owl. The management guidelines for protected areas from the recovery plan are to take precedence for activities within protected areas. "Restricted habitat" includes mixed conifer forest, pine-oak forest, and riparian areas; the recovery plan provides less specific management guidelines for these areas. The Recovery Plan provides no owl specific guidelines for "other habitat."

The range of the Mexican spotted owl in the United States has been divided into six recovery units (RUs) as identified in the Recovery Plan (US Fish and Wildlife Service 1995, part II.B.). An additional five recovery units were designated in Mexico. The recovery plan identifies recovery criteria by recovery unit. The Upper Gila Mountain Recovery Unit has the greatest known concentration of owl sites in the United States. This unit is considered a critical nucleus for the owl because of its central location within the owl's range, and presence of over 50 percent of the known owls. The other recovery units in the United States, listed in decreasing order of known number of owls, are: Basin and Range-East, Basin and Range-West, Colorado Plateau, Southern Rocky Mountain-New Mexico, and Southern Rocky Mountain-Colorado.

From 1991 through 1997, Gutierrez *et al.* (1997, 1998) studied the demographic characteristics of two Mexican spotted owl populations in the Upper Gila Mountains Recovery Unit. The owl populations studied were located on the Coconino and Gila National Forests. Results of this several-year study have shown a decline in the population trend of Mexican spotted owls within these areas. The reason for the reported decline is unknown. According to Gutierrez *et al.* (1997), such a trend could be a result of: 1) density dependent responses to an increase over carrying capacities; 2) a response to some environmental factor; or 3) senescence. The latter (i.e. senescence) seems unlikely because there was also a negative linear trend in survival estimates for owls less than three years of age. Regarding carrying capacities, responses to density dependence are difficult to prove in the absence of removal or additional experiments. Environmental factors

undoubtably play a role in owl survival, either through weather events causing direct mortality or indirectly through reduced habitat or prey (Gutierrez *et al.* 1997). This study found that the ability of adult birds to survive successive years of poor environmental conditions may be low (Gutierrez *et al.* 1998).

At the end of the 1995 field season, the Forest Service reported a total of 866 management territories (MTs) established in locations where at least a single MSO had been identified (U.S. Forest Service, *in litt.* November 9, 1995). The information provided at that time also included a summary of territories and acres of suitable habitat in each RU. Subsequently, a summary of all territory and monitoring data for the 1995 field season on Forest Service lands was provided to the Service on January 22, 1996. There were minor discrepancies in the number of MTs reported in the November and January data. For the purposes of this analysis we are using the more recent information. Table 1 displays the number of MTs and percentage of the total number of each Forest (U.S. Forest Service, *in litt.*, January 22, 1996).

The Forest Service has converted some MTs into PACs following the recommendations of the Draft MSO Recovery Plan released in March 1995. The completion of these conversions has typically been driven by project-level consultations with the Service and varies by National Forest.

The Forest Service has formally consulted on 198 timber sales and other projects in Arizona and New Mexico since August 1993. These projects have resulted in the anticipated incidental take of 106 MSO. In addition, the Bureau of Indian Affairs has consulted on one timber sale on the Navajo Reservation which resulted in an anticipated take of five MSO, and a highway reconstruction which resulted in the anticipated incidental take of two MSO. The Federal Highway Administration has consulted on one highway project that resulted in an undetermined amount of incidental take. The take associated with this action will be determined following further consultation. Additionally, the biological opinion for the Kachina Peaks Wilderness Prescribed Natural Fire (PNF) Plan (#2-21-94-F-220) determined thresholds for incidental take and direct take as follows: 1) one spotted owl or one pair of spotted owl adults and/or associated eggs/juveniles; 2) harm and harassment of spotted owls located in up to two PACs per year; 3) disturbance to spotted owls and habitat modification of a total of seven PACs during the life of the Kachina Burn Plan related to management ignited fire occurring in PACs for which the nest site information is three or more years old; 4) harm and harassment of spotted owls and habitat caused by PNF for which adequate surveys have not been conducted, and; 5) harm and harassment of spotted owls and habitat modification of up to one PAC and 500 acres of potential nest/roost habitat caused by wildfire as an indirect result of PNF during the life of the Kachina Burn Plan.

The Department of the Navy consulted on an observatory project with an anticipated take of one MSO. Consultation with Langley Air Force Base (#2-22-96-F-334) for overflights in both New Mexico and Arizona concerning German Air Force operations at Holloman Air Force Base in New Mexico (for flights over the southern half of New Mexico, southwest Texas, and 40 square miles in eastern Arizona), determined that incidental take of MSO would occur due to harassment. The precise level of the take was impossible to predict due to lack of adequate data. However, incidental take is considered to be exceeded if five percent of monitored PACs are believed to have

Table 1. Number of management territories (MTs) as reported by the Forest Service (U.S. Forest Service, *in litt.*, January 22, 1996), percent of MTs as a proportion of the MTs in Forest Service Region 3, and the percent of suitable habitat surveyed in each Forest by National Forest (Fletcher and Hollis 1994).

National Forest	Number of MTs	Percent of MTs	Percent Suitable Habitat Surveyed
Apache-Sitgreaves	122	14.0	99
Carson	3	0.3	62
Cibola	43	5.0	41
Coconino	155	17.8	87
Coronado	108	12.4	49
Gila	197	22.7	50
Kaibab	6	0.7	96
Lincoln	126	14.5	90
Prescott	10	1.2	42
Santa Fe	33	3.8	44
Tonto	66	7.6	55
TOTAL	869	100	

become nonfunctional through harassment from the overflight. Bandelier National Monument (2-22-95-F-532) consulted on a prescribed fire project with an anticipated direct mortality of one MSO and no more than one PAC buffer area burned.

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 to provide a platform to assess the effects of the action now under consultation.

The Lone Mountain Prescribed Fire is located within the Basin and Range - West RU as defined by the MSO Recovery Plan (US Fish and Wildlife Service 1995). This RU is a relatively broad

band bounded on the north and northeastern edges by the Upper Gila Mountains RU, on the eastern edge by the Basin and Range - East RU, along the southern edge by the United States - Mexico border, and on the western edge by the Colorado river. Vegetation in this RU ranges from desert scrubland and semi-desert grassland in the valleys upwards to montane forests. Owls inhabit a variety of habitat types in this RU. The majority of owls occur in isolated mountain ranges where they inhabit encinal oak woodlands, mixed-conifer and pine-oak forests, and rocky canyons. Federal lands make up 36 percent of this RU and are mostly administered by the Bureau of Land Management, followed by the Forest Service and a small amount by the National Park Service. Privately-held lands amount to 22 percent, State lands are 19 percent, Tribal lands are 12 percent, and Department of Defense lands are 11 percent. Most MSO occupy lands administered by the Forest Service and the majority of those owls reside within the boundaries of the Coronado National Forest (US Fish and Wildlife Service 1995).

The risk of habitat loss due to catastrophic wildfire is moderately high. In the past four years, the Noon, Arcadia, Clark Peak and Lone Fires have resulted in the loss of Mexican spotted owl habitat within this RU. A large, widespread fire in 1899 was the first of a series of stand-replacing fires in the Huachuca Mountains during the last century. Major, recent stand-replacing fires in the Huachuca Mountains have occurred in 1977 and 1991 (upper Carr, Miller, Hunter canyons), 1983 (Pat Scott Canyon), and 1988 (Ash Canyon to the international boundary) (Danzer *et al.* 1997, Taylor 1991). Although the Coronado National Forest does not have an active timber program, localized projects in the Huachucas and other ranges in the Sky Island Division, such as road construction, mining, and other construction may adversely affect the owl or its habitat.

Nineteen spotted owl management territories or PACs are known from the Huachuca Mountains, including seven on Fort Huachuca and 12 on Coronado National Forest lands (Duncan *et al.* 1993, Service files). Three PACs occur on the eastern boundary of the project area, including the Upper Bear Creek, Wakefield, and Sunnyside PACs. The western boundary of the Bear Creek PAC is approximately 0.5 mile from the eastern boundary of the escaped fire contingency zone. The Wakefield PAC overlaps the escaped fire contingency zone between Wakefield Mine and Copper Glance Mine. The edge of the Sunnyside PAC overlaps the edge of the escaped fire contingency zone in the Rattlesnake Peak area (U.S. Forest Service, Coronado National Forest 1998a). None of the PACs are closer than 1.2 mile to the proposed burn area. All three PACs have been monitored since 1992. No owls were detected in the Wakefield PAC from 1992-1997. In the Sunnyside PAC two young were fledged in 1992, no nesting was observed from 1994-1997, and a single male was present in 1998. In the Upper Bear Creek PAC two young were fledged in 1992, no nesting was observed in 1994-1995, and one young fledged in 1997. Surveys for MSO have been conducted between the PACs and the proposed burn area in Lone Mountain Canyon and its tributaries, and near Wakefield Mine, but no MSO have been detected in these areas (Dave Swearingen, Coronado National Forest, Sierra Vista, AZ, pers. comm. 1998). Small patches (several acres) of forest occur on the northeast slope of Lone Mountain Canyon, but they are too small to support breeding spotted owls, and are not considered "restricted habitat". Russell Duncan (Southwestern Field Biologists, Tucson, pers. comm. 1999), who surveyed Lone Mountain Canyon in 1991 for spotted owls, does not believe Lone Mountain Canyon is suitable

breeding habitat for MSO. In the Huachuca Mountains, MSO are generally found at higher elevation and in more heavily-wooded areas than the project area.

Prescribed fire or fire suppression could result in adverse effects to owls and their habitat. Direct effects to Mexican spotted owl may include death of adults and/or juveniles, flushing of Mexican spotted owl off nests/roosts, smoke inhalation, and human disturbance related to fire suppression actions. Indirect effects may include loss or degradation of nesting or foraging habitat, and reduced prey densities and availability. These topics are elaborated in Patton *et al.* (1991), Stacey and Hodgson (1995), Ward and Block (1995), Irvine (1991), and US Fish and Wildlife Service (1995).

No burning is proposed in PACs and the Coronado proposes to suppress the fire if it burns into the escaped fire contingency zone and burns more than 10 acres. Thus, the likelihood of the fire becoming a wildfire and burning cross country for 1.2 mile or more to a PAC is highly unlikely and the effects of such an event are thus considered discountable.

Reducing the likelihood of stand-replacing fire in the project area reduces the chance that a catastrophic wildfire would begin at the lower elevations and sweep into the high country where PACs occur. The MSO recovery plan finds that "Given the present conditions of Southwestern forests, extreme fire years could result in holocaustic fires throughout large portions of the owl's range. Because the resulting damage to owl habitat would be irreparable in the forseeable future, efforts to limit large-scale catastrophic fires are of the utmost importance for owl conservation." One of the objectives of the proposed action is to reduce the likelihood of catastrophic, stand-replacing fire.

CONCLUSION

After reviewing the current status of the Mexican spotted owl, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with the Coronado's determination that the proposed action may affect, but is not likely to adversely affect, the Mexican spotted owl. No critical habitat is designated for this species, thus none will be affected. Our concurrence is based on the following:

1) The proposed action is consistent with the recommendations of the MSO recovery plan.

2) No burning is proposed in PACs, and the likelihood of the fire burning out-of-control and into a PAC is very low.

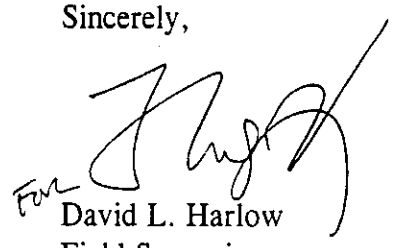
3) No potential MSO breeding habitat occurs in the project area.

4) The proposed action is expected to reduce the chance of catastrophic, stand-replacing fire in MSO habitat.

CLOSING STATEMENT

This concludes formal consultation on the Coronado National Forest's proposed Lone Mountain Prescribed Fire, Cochise County, Arizona. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may adversely 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 a listed species or critical habitat that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by this action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation, if it is determined that the impact of such taking will cause an irreversible and adverse impact to the species. Any questions or comments should be directed to Jim Rorabaugh or Tom Gatz of my staff.

Sincerely,



For David L. Harlow
Field Supervisor

cc:Regional Director, Fish and Wildlife Service, Albuquerque, NM (Attn: S. Chambers)

Director, Arizona Game and Fish Department, Tucson, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ
Superintendent, Coronado National Memorial, Hereford, AZ

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