

United States Department of the Interior
U.S. Fish and Wildlife Service
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 FAX: (602) 242-2513

In Reply Refer To:
AESO/SE
2-21-01-F-241

December 14, 2001

Memorandum

To: Field Manager, Kingman Field Office, Bureau of Land Management, Kingman, Arizona

From: Field Supervisor

Subject: Biological Opinion for the proposed prescribed burn program within the Kingman Field Office boundaries - Pine Lake Wildland/Urban Interface

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed implementation of a prescribed fire program within land administered by the Kingman Field Office of the Bureau of Land Management (BLM), located in Mohave and east Yavapai counties, Arizona, and its effects on the Hualapai Mexican vole (*Microtus mexicanus hualpaiensis*) in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). Your March 14, 2001, request for formal consultation was received on March 16, 2001.

This biological opinion is based on information provided in the biological evaluation attached to the March 14, 2001, request for consultation; additional information provided by the BLM via electronic mail; the April 18, 2001, field investigation; telephone conversations; and other sources of information. A complete administrative record of this consultation is on file at this office.

Consultation History

The Service received BLM's March 14, 2001, request for formal consultation on March 16, 2001. The request included the "Biological Evaluation: Programmatic Environmental Assessment for Prescribed Fire" (BE). BLM determined that the proposed action is likely to adversely affect the Hualapai vole and is not likely to adversely affect the Mexican spotted owl (*Strix occidentalis lucida*).

In a letter dated April 12, 2001, the Service acknowledged the initiation of formal consultation regarding the effects to the Hualapai vole and concurred with BLM's determination that the proposed action is not likely to adversely affect the Mexican spotted owl.

On April 18, 2001, representatives from the Service and BLM toured the ponderosa pine (*Pinus ponderosa*)/Gambel oak (*Quercus gambelii*) communities of the Hualapai Mountains, including occupied and historically occupied Hualapai vole habitat.

On June 5, 2001, the Service requested additional details and clarifications of the project description via electronic mail. The information was provided via electronic mail from BLM on June 11, 2001. The requested map was received by the Service on June 14, 2001.

In a telephone conversation on July 12, 2001, between BLM and Service biologists, the Service recommended that all areas targeted for treatment in the action area, not just ponderosa pine communities, be surveyed prior to treatment for the presence of Hualapai vole based on known vole locations and recent information regarding habitat utilization. Furthermore, the Service recommended that if vole presence is determined in any vegetation community, the area should be avoided and protected from treatments within the vicinity of the occupied area as described in the BE for ponderosa pine communities. BLM agreed that these measures could be taken.

In a letter dated, July 27, 2001, the Service requested a 60-day extension of consultation due to work load and staff shortage issues.

On September 25, 2001, the Service provided a draft biological opinion, as requested by BLM. In a telephone conversation between Service and BLM biologists on September 26, 2001, it was mutually agreed that consultation should be extended to ten days after the Service receives BLM's comments. On October 23, 2001, a meeting and field visit between the Service and BLM was held in the Hualapai Mountains to discuss BLM's preliminary comments on the draft BO. In a memorandum dated December 5, 2001, BLM provided their final comments to the Service.

BIOLOGICAL OPINION

I. DESCRIPTION OF PROPOSED ACTION

The Kingman Field Office of the BLM proposes to implement a prescribed fire program within four vegetation communities located on BLM-administered lands within Mohave and east Yavapai Counties in northwestern Arizona. Private and state lands would be burned or mechanically treated only if within proposed areas and with the landowners' approval. The life of the programmatic assessment is 10 years. After 10 years, the programmatic environmental assessment would be reevaluated and updated as needed.

The proposed prescribed fires would be conducted to decrease the hazardous fuel levels, encourage herbaceous forage production and improve wildlife habitat. Prescribed fire would be done in a more controlled situation than if these areas were to burn naturally as a result of wildfire. BLM believes that prescribed fires in the early fall would be less intense and have less adverse effect on resources than wildfires during the hot summer months.

The four vegetation communities proposed to receive treatment for fuel load reduction and improvement of ecosystem health are: (1) Arizona interior chaparral, (2) semi-desert grassland, (3) juniper-mountain shrub, and (4) ponderosa pine forest. No treatments are proposed for the lower elevation vegetation communities located within the Kingman Field Office boundaries, which include Mohave Desert shrub, Sonoran Desert, California juniper-crucifixion thorn-Joshua tree communities, or any riparian-wetland community.

According to the BE, ponderosa pine within the Hualapai Mountains is the only community proposed for treatment in which federally listed species occur, specifically the Hualapai vole. The BE, therefore, focused primarily on this vegetation community in the Hualapai Mountains. It is the Service's opinion, however, that treatment within the Arizona interior chaparral, which also occurs on the Hualapai Mountains, may adversely affect the Hualapai vole (see "ENVIRONMENTAL BASELINE," below). The other two communities, juniper-mountain shrub and semi-desert grasslands, are not targeted for treatment on the Hualapai Mountains (D. Smith, BLM, pers. comm. 2001).

Implementation of the project include the following considerations and methods:

Burn conditions - An adequate litter layer of grasses, pine needles, and duff must be present in the understory for a successful prescribed burn. According to the BE, the lack of understory herbaceous fuel is not likely to be a problem as livestock grazing is managed by exclosures, steep terrain, or through pasture rotation and the targeted areas are not grazed during the spring-summer growing season.

Time of Year - Prescribed fires would be scheduled during the next 10 years for the period between September 1 and March 15. Treatment in chaparral would occur during the latter part of this time frame, in winter and/or early spring. These prescribed fires would follow the summer monsoon period which would encourage additional herbaceous growth. Post-monsoon burns would help avoid the dry conditions that could result in extremely hot fires that reduce the recruitment of grasses and forbs.

Ignition methods- Fires would be ignited by drip torch, plastic sphere dispenser, and/or helitorch (helicopter-mounted flamethrower) depending upon the access and terrain. Some sites, such as Pine Peak, Wabayuma Peak, and numerous small, isolated stands are inaccessible by road. Fire fighters would hike into these sites and use drip torches to ignite the burns. The advantage of this method is greater control of the fire. These burns would be of lower intensity and spread. Areas within the stands, such as those surrounding snags, sensitive species habitat, grass/forb patches, cultural sites, or range improvements, would be protected by fire breaks and precision ignitions.

In stands where large portions are not considered sensitive species habitat, plastic sphere dispenser (PSD) or helitorches could be used where there is little likelihood of impacting valuable resources. PSDs dispense small spheres (commonly referred to as "ping-pong balls") containing potassium permagnate. These balls are injected with ethylene glycol as they are shot, which causes the sphere to explode in 20 seconds, igniting vegetation.

Burn Size and Frequency - Entire stands of ponderosa pine would not be burned at one time. Efforts would be made to produce a mosaic of 60 percent burned and 40 percent unburned in suitable vole habitat. Mosaic burns would also be conducted in chaparral; however, burned versus unburned percentages would vary depending on location and objectives (e.g., habitat maintenance, hazardous fuels reduction). The frequency of prescribed fire in the ponderosa pines community would depend on persistence of understory forbs and grasses, and the regrowth of ponderosa pine seedlings, with an expected interval period of 10 years. Chaparral treatments would occur in 10- to 20-year intervals where prescribed burning is used to reduce fire hazards near a community and in 20- to 40-year intervals elsewhere. These intervals would allow treated areas to recover and would produce vegetation for feed and ground cover for wildlife.

Under optimal conditions, up to approximately 100 acres of ponderosa pine community would be burned annually, for a maximum of 1000 acres over the life of the project. It is unlikely that more than two stands would be treated in any year. Burning in either vegetation community is dependent upon many variables. Late summer rains may decrease the window of time available to burn. Areas with poor access would take longer to burn, resulting in fewer total acres. Depending upon the summer wildfire season, there may be a shortage in the availability of fire fighters to perform the burn until later in the proposed time frame.

The 1991 "Vegetation Treatment on BLM Lands Final Environmental Impact Statement" states that in most cases BLM policy requires that no livestock be allowed on a burn area for two growing seasons after a prescribed burn. The ponderosa pine areas are either inaccessible to livestock or only grazed during the fall-winter season. BLM will coordinate with grazing allotment permittees to establish a rest period, as required. When objectives for burning chaparral include improving forage quality or quantity for livestock, a grazing rest period would not be required.

Mechanical Treatment - Chainsaws, hand-tools, and mechanized brush and tree removal equipment may be used to create 5- to 50-foot wide vegetation-free zones to protect snags and occupied sensitive species habitat within proposed burn sites. Mechanical thinning is proposed for the areas around the Pine Lakes subdivision and Hualapai Mountain Park. These areas, adjacent to private lands, are too close to private homes and property to allow burning.

Mechanized or motorized equipment use in wilderness would be reviewed to determine whether they are the minimum tools needed to successfully, safely, and economically accomplish the task, and cause the least degradation of wilderness values.

Monitoring - At a minimum, BLM will monitor the recovery of each burn site by setting up photo-points that will be photographed annually for the life of the project.

Conservation Measures

The following measures will be implemented as part of the proposed action in order to avoid or minimize any adverse effects to Hualapai voles:

1. All treatment areas would be surveyed for Hualapai vole occupancy prior to treatments in order to determine project modifications and/or avoidance and protection of occupied areas. Surveys would occur within ponderosa pine stands, transition areas between ponderosa pine and chaparral communities, and springs, washes, and other potentially suitable habitat areas that are within or immediately adjacent to areas identified for treatment. BLM biologists will document voles by the presence of their runways and fresh vegetation clippings using Arizona Game and Fish Department's 1994 "Survey Techniques for Mexican Voles in Northwest Arizona." Until surveyed, all potential vole habitat is considered occupied. Areas not considered suitable (e.g., areas dominated by thick pine needles and duff) would also be surveyed prior to treatment to protect existing snag habitat for potential future use by Mexican spotted owl. Suitable vole sites within proposed burn areas would be protected by firebreaks, precision ignition of fire around such sites, or total avoidance of the area. Fire plans will incorporate site specific features (e.g., rock outcroppings, game trails), fire behavior, and professional judgement to determine the most appropriate method to protect occupied vole habitat. Additionally, monitoring of fuel moisture and use of the appropriate minimum impact suppression tactics would be used to reach the desired objective at each site.
2. Fire lines would be constructed around the occupied sites in ponderosa pine stands by raking away pine needles down to mineral soil. Rakes would be the most efficient means to clear the line. Brush would be cut with a Pulaski (a specialized ax/hoe tool), if needed. Fire line width would depend upon adjacent fuels, with thick brush or dense stands of small ponderosa pine needing a wider fire line. These fire lines would not be wide enough to cause significant erosion or impacts to grass/forb seed bank. Typically, fire lines within these communities are 2 to 4 feet wide. On steep slopes, a cup trench would be necessary to catch burning material that may roll downhill and otherwise cross the fireline. The cup trench would be constructed by cutting a few inches into the hillside and using the removed dirt to form a berm. In chaparral, areas would be protected by precision ignition, complete avoidance of a sensitive area, and/or fire lines. In the chaparral community, lines are typically constructed by removing brush with saws, causing minimal ground disturbance. As in ponderosa pine, fire line width will depend on adjacent fuels. Lines and/or trenches would be placed prior to the prescribed burning by fire crew and resource advisor/biologist. As part of the mandatory fire briefing held prior to prescribed burning, all employees would be briefed on the objectives of the burn and the concerns regarding endangered species habitat. A biologist will be on site at all times during the prescribed burning. Lines and trenches will be rehabilitated to the extent practicable with materials available at the site.

3. To minimize impacts to Hualapai voles during the breeding season, a timing restriction would only allow activities to occur in occupied or potential habitat between September 1 and March 15. Areas not considered suitable for Hualapai voles (e.g., dominated by thick pine needles and duff) may be burned prior to the September 1 date if surveyed prior to treatment.
4. No off-road vehicle driving would occur during prescribed burn or mechanical treatments in potential or suitable Hualapai vole habitat.
5. Each prescribed burn must have an individual burn plan prepared for it. These burn plans include contingency plans in case the prescribed fire escapes and becomes a wildfire. The plans includes information regarding adjacent resources that can be damaged by fire and issues procedures for notifying other fire agencies for assistance. The Kingman Field Office administers a SEAT (Single engine air tanker) base in Kingman in which a plane can be called upon to drop slurry in the case of a wildfire. Most fires would involve the use of a helicopter which, if needed, can be used for water bucket drops.

II. STATUS OF THE SPECIES

Species description

The Hualapai Mexican vole (*Microtus mexicanus hualpaiensis*) was listed as an endangered species without critical habitat in a Federal Register notice dated November 2, 1987 (52 FR 36776). The Hualapai vole is listed as endangered on the Arizona Game and Fish Department's list of Threatened Native Wildlife in Arizona.

The Hualapai vole was first described in 1938 by E. A. Goldman. Although Hoffmeister (1986) accepted the taxonomy, he considered it to be a "poorly defined subspecies, in part because the sample size is so small." A total of fifteen Hualapai voles were observed or handled between 1923 and 1984 (U.S. Fish and Wildlife Service 1991). The Hualapai vole is a thick-set, blunt-nosed, short-legged rodent, with a short tail, and small ears obscured by coarse, dark cinnamon-brown fur. In comparison to the two other subspecies of Mexican vole in the United States (i.e., *M. m. mogollonensis* and *M. m. navaho*), the Hualapai vole is of medium size, has long hind feet, and a pale dorsum.

The type locality for the Hualapai vole is in the Hualapai Mountains in Mohave County. Hoffmeister (1986) also referred two specimens from the lower Prospect Valley (90 miles north of the Hualapai Mountains) to this subspecies because they are larger than *M. m. navaho*, although on a geographic basis, they seemed more referable to *M. m. navaho*. Hoffmeister (1986) suggests a larger sample size is needed to clearly determine which subspecies the Prospect Valley population should be assigned to. Spicer *et al.* (1985) reports that four specimens from the Music Mountains (50 miles north of Hualapai Peak and 56 miles southwest of Prospect Valley) were collected in 1981 and suggests additional studies, trapping, and taxonomic comparison be conducted for the three areas (Hualapai Mountains, Prospect Valley, and Music

Mountains) to clarify their status. Spicer *et al.* (1985) considered the clarification critically important because those populations are “apparently completely isolated from any other population of *Microtus*.” Frey (1989) considered the Music Mountain specimens to be morphologically distinct from the other subspecies and suggested that this population could represent an unrecognized race. However, in subsequent studies, Frey and Yates (1993, 1995), tentatively concluded that the Music Mountain population was referable to *M. m. hualpaiensis*.

Notes on geographic distribution of Mogollon voles (*Microtus mogollonensis*) were reported by Frey and LaRue (1993) in which they recognize *M. mogollonensis* as distinct from *M. mexicanus*. According to Frey and LaRue (1993), *M. mogollonensis* “occurs in New Mexico and Arizona with peripheral populations in Utah, Colorado, and Texas.” The systematics of “Mogollon” (= Mexican) voles in general and Hualapai voles in particular was investigated by Frey and Yates (1995). This work further emphasizes Frey and LaRue’s 1993 recognition that voles assigned to *Microtus mexicanus* in the United States should probably be classified as *M. mogollonensis*, while populations in Mexico would retain the name *M. mexicanus*. They also identified unique alleles at the IDH-1 and GDH loci, suggesting that populations from the Hualapai Mountains, Music Mountains, Hualapai Reservation, Aubrey Cliffs, Chino Wash, Santa Maria Mountains, and Bradshaw Mountains may form a group of closely related populations which could be regarded as *M. mogollonensis hualpaiensis* (Frey and Yates 1995). Thus, there is an indication that other populations of voles outside of the Hualapai Mountains may be assignable to the taxon currently known as the Hualapai Mexican vole. However, Frey and Yates (1995) concluded that such taxonomic conclusions should be considered tentative because they are based on small samples.

The question of the subspecies range continues to be investigated through genetic analysis. Recently, Busch *et al.* (2001) conducted a two part analysis. In part one, a genetic analysis was conducted to determine the evolutionary relatedness of the six vole populations: (1) Hualapai Mountains, (2) Hualapai Reservation, (3) Bradshaw Mountains, (4) Prescott area, (5) Sierra Prieta, and (6) Mingus Mountain. Their results suggested that all six populations “were genetically similar and might be referable to *M. m. hualpaiensis*.” However, they believed that in order to validate this possibility, samples from a wider geographic range would be needed. In the second part of their analysis, a subset of samples used by Frey and Yates’s 1995 study were obtained. The samples consisted of specimens from Aubrey Cliffs, Kaibab National Forest-Grand Canyon South Rim, San Francisco Peaks, Mogollon Rim, Chuska Mountains, and White Mountains. Busch *et al.*’s (2001) findings did not support the current separation of *M. mogollonensis* (= *mexicanus*) in Arizona into three separate subspecies. Voles in the White and Chuska mountains, however, may be an exception that could be considered a different subspecies, or they may exhibit “genetic distance due to geographic isolation” (Busch *et al.* 2001). Furthermore, the authors believe voles from the Prescott area (Bradshaw Mountains, Watson Woods, and Sierra Prieta) to be of concern because of low mitochondrial diversity.

Pending peer review of the above genetic studies, the Service considers only those voles in the Hualapai Mountains, which includes the action area, to be federally listed and subject to section 7

consultation. Additionally, the Service will continue to refer to the federally listed subspecies as Hualapai Mexican vole (*Microtus mexicanus hualpaiensis*) until it is determined that a technical correction of the common and scientific name is appropriate according to Service policy.

Life history

Very little life history information is available for this subspecies, therefore the recovery plan assumes the life history of the Hualapai vole is similar to that of the Mexican vole (*Microtus mexicanus*), where specified.

Hualapai voles have been observed both day and night, and are likely active year-round, which is consistent with observations of other *Microtus* (U.S. Fish and Wildlife Service 1991). Signs of the Hualapai voles presence include runways, burrow entrances, scat, and grass cuttings (Spicer *et al.* 1985, Kime *et al.* 1995). “Runways” are tunnel-like paths that go from one burrow entrance to another or to feeding or cutting sites among the grasses and are a distinctive vole sign. Runways average 1.4 inches in width and may run up to 16 or more feet with several side branches (Spicer *et al.* 1985). Currently, information regarding home range and activity areas is lacking. Based on capture patterns and the extensive, interconnected networks of runways, Spicer *et al.* (1985) believes the subspecies is colonial.

Microtus diets usually consist of green plant material when it is available. Observations from Hualapai runway surveys suggest that this subspecies has a typical vole diet of forbs and grasses (U.S. Fish and Wildlife Service 1991). Observation of bright green fecal pellets during Hualapai vole surveys (Spicer *et al.* 1985, Boyett 2001) further supports this dietary hypothesis.

Reproductive characteristics of the Hualapai vole are assumed to be similar to those of other *M. mexicanus* subspecies, which have relatively small litters. *M. mexicanus* have only four mammary glands; other *Microtus* in Arizona have eight (Hoffmeister 1986). Hoffmeister (1986) found a mean of 2.51 embryos (with a range of one to six) from 49 *M. mexicanus* collected in Arizona and cites a 1968 study by Larry Brown as finding a mean of 2.23 embryos (with a range of one to four) from 22 specimens collected in Flagstaff, Arizona. Pregnant females of *M. mexicanus* are present, at least, from late spring through summer (U.S. Fish and Wildlife Service 1991). Limited data from New Mexico suggest that *M. mexicanus* has a “seasonally restricted” breeding period between May and November; however, pregnant *M. mexicanus* were captured in Coahuila, Mexico in January in 1956 (Keller 1985). Keller (1985) suggests that the characterization of *M. mexicanus* as a seasonally restricted breeder should be tentative, pending further data. Acceptance of the proposed splitting of the Mexican and southwestern United states voles into *M. mexicanus* and *M. mogollonensis*, respectively, may further explain the difference in observations.

As of the date of the recovery plan, the Hualapai vole had been found between 5,397 and 8,399 feet in elevation in the Hualapai Mountains. Sites were within a band of about 4.0 miles from east to west and 15.0 miles from north to south, roughly centered along the main ridge of the mountain range. Most of the sites were somewhat clustered in two areas: several sites near the

northern end of the distribution and a smaller group about 9.3 miles to the south. Vole habitat is very patchy and localized within this larger area, mostly in wash bottoms, near perennial water, or on north facing slopes. At the time the recovery plan was completed (following a somewhat dry period) the total area of known occupied habitat was believed to be as small as 314 acres.

The recovery plan states that *M. mexicanus* are generally associated with woodland forest types containing grasses and grass sedge associations. The Hualapai vole was associated with moist grass-sedge areas along permanent or semi-permanent waters fed by springs or seeps in either open forest or chaparral. Good cover of grasses, sedges, and forbs is characteristic of this waterside vole habitat, which is found in narrow bands paralleling water courses.

The most recent status review and results of field surveys for the Hualapai vole provide additional information regarding its distribution and habitat (Kime *et al.* 1994, 1995; Boyett 2001). During 1990-95, 66 Hualapai voles were captured or observed in 20 different specific sites (14 separate areas) of the Hualapai Mountains. Several of these were at or near known historical locations, but others were as far as 2.5-3.0 miles from previously known sites. Most of these new localities simply lowered the known elevational range or filled spatial gaps between previously known sites. The periphery of the overall range was extended no more than 1.0-2.0 miles in each of the four cardinal directions, making the total extent of the range approximately 7 by 18 miles. These surveys showed that the subspecies occurs at more sites and in slightly more varied habitat types within the Hualapai Mountains than was previously thought.

All vole habitat sites surveyed from 1991-1995 were within or very near the pine-oak vegetation belt (Kime *et al.* 1995). The pine-oak belt, in the Upper Sonoran life zone, is characterized as moderate in moisture supply, temperature, and soil conditions. Average annual precipitation is between 20.1 and 25.2 inches. Elevation typically ranges from 6,500 to 8,000 feet. Various species of shrubs and grasses are common in the pine-oak belt. Four of the vole locations were lower than this range, and the actual range of elevation for the vole sites was 5,719 to 7,848 feet. The surveys conducted in 1991-95 found that Hualapai Mexican voles in the Hualapai Mountains also use dry grassy areas on moderate to steep slopes with mainly north-facing aspects. Gambel oak was present at most capture sites and ponderosa pine was present or in adjacent areas. New Mexican locust (*Robinea neomexicana*), mountain snowberry (*Symphoricarpos oreophilus*), and other plants were identified as frequently occurring at occupied habitat sites. Vole sites were also characterized by aspect, ranging from 290 to 114 degrees, and slope, ranging from zero to 41 percent (Kime *et al.* 1995).

The presence or absence of *Microtus* likely determined by vegetation more than any other single environmental factor (Rose and Birney 1985). The presence of fairly dense grass cover is considered important, if not critical, for this subspecies. Boyett (2001) found a strong relationship between the local distribution of Hualapai voles and the microhabitat. He found that Hualapai voles were associated with areas in which understory trees and abundant grass, forb, and low shrub cover were present.

Population dynamics

Population levels of other *Microtus* fluctuate on annual and perennial cycles, and it is likely the case for Hualapai voles (U.S. Fish and Wildlife Service 1991). Hualapai vole cycles may correspond with precipitation and the resulting growth of vegetation (Spicer *et al.* 1985). To date, estimations of population sizes and/or stability have not been made or are not available.

Status and distribution

The factors for listing the subspecies included its rarity and restricted habitat along with threats posed by (1) drought; (2) elimination of ground cover (grasses, sedges, rushes, and forbs) around open water and seeps primarily due to grazing, human recreation (e.g., camping and off-road vehicle activities), and (3) water development; and (4) activities that cause or exacerbate erosion (e.g., road construction, overuse by livestock, concentrated recreation).

In 1998, survey results suggested that vole populations are capable of increasing rather rapidly in response to favorable rainfall. After abundant rainfall in the winter of 1997-98, voles were documented at several new localities, including some in habitats not previously considered to be typical for the vole (e.g., shrub dominated areas and areas with no woody vegetation), and were more easily observed than in prior years (R. Winstead, Arizona Game and Fish Department, pers. comm. 2001). Boyett (2001) confirmed the continued presence of Hualapai voles in the Hualapai Mountains through trapping or visual observation at seven study sites as well as observation of voles or vole sign at a minimum of 12 additional sites that were not trapped. As with previous observations (Getz *in* Tamarin 1985, Spicer *et al.* 1985, Kime *et al.* 1995), Boyett (2001) found Hualapai voles in both xeric and mesic areas, such as open grass-shrub covered slopes and grass-sedge vegetation along drainages, respectively.

Most known Hualapai Mexican vole habitat is now excluded from grazing. Near the northern end of the vole's distribution, an enclosure comprising about ten sections of BLM, Mohave County (Hualapai Mountain County Park), and private land encompasses nearly half of all known sites, and probably more than half of the total area of known habitat. An approximately 2200-acre enclosure protects a cluster of sites at Pine Flat, an area of fairly heavy recreational use. A 10-acre enclosure in Crow Canyon protects the southernmost and easternmost known locality. A partial enclosure, using fencing and natural barriers, is intended to preclude livestock access to vole habitat on and around Pine Peak. Preliminary monitoring indicates that this partial enclosure has been effective at excluding livestock for the past two years. On the Yellow Pine Allotment, BLM has installed a small enclosure around Jeep Spring and a partial enclosure protecting habitat above Jeep Spring. Outside of the Yellow Pine Allotment, two known Hualapai Mexican vole localities are currently open to livestock grazing. These are at Dean Peak (the northernmost known locality, on Arizona State Trust land) and Wabayuma Peak (the westernmost known locality, within a BLM wilderness area).

III. 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 (50 CFR §402.02). The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Definition of the Action Area

The “action area” means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. The action area for the proposed action includes all ponderosa pine and Arizona interior chaparral stands within the Hualapai Mountains targeted for treatment that (1) are within the management authority of the BLM, (2) other lands (e.g., state, county, and private) for which BLM has received permission to treat, and (3) lands that are immediately adjacent to areas to be treated, regardless of ownership. Because of the mosaic of vegetation communities within the Hualapai Mountains and the potential for prescribed fire to spread beyond the intended boundaries, the Service considers the action area to be larger than the pine-oak community that the BE focused on. Hualapai voles were historically associated with moist grass-sedge areas along permanent or semi-permanent waters fed by springs or seeps in either open forest or chaparral and more recently found within or very near the pine-oak vegetation belt, shrub dominated areas, and open, grassy areas. Voles, therefore, could occur within vegetation communities, in addition to ponderosa pine, that may be adjacent to or surrounded by Arizona interior chaparral.

Arizona interior chaparral is located at elevations between 3,497 and 6,499 feet depending upon slope exposure, soils, and climate. It is considered a true climax community that persists after recurrent fires. Major vegetation species include scrub or turbinella oak (*Quercus turbinella*), mountain mahogany (*Cercocarpus montanus*), Wright silktassel (*Garrya wrightii*), sugar sumac (*Rhus ovata*), and wait-a-minute bush (*Mimosa biuncifera*). Grass species include sideoats grama (*Bouteloua curtipendula*). Chaparral cover varies from sparse to continuous with an average height of four to six feet. In the Hualapai Mountains, this vegetation community is found mostly on south-facing slopes and a few west-facing slopes.

The ponderosa pine community is found in scattered stands on north-facing slopes and in cooler east-west mountain drainages. This community is characterized by older growth trees with an understory of herbaceous shrubs, perennial grasses, and forbs. Some understories are dominated by dense stands of young age-class ponderosa pine, slash and a thick pine needle duff layer. These stand may also include Gambel oak as part of the overstory and/or understory. Other understory species include snowberry (*Symphoricarpos rotundifolius*), New Mexican locust (*Robinia neomexicana*), manzanita (*Arctostaphylos pringlei*), scrub oak, muttongrass (*Poa fendleriana*), Kentucky blue grass (*P. pratensis*), blue and black grama, and numerous annual grasses and forbs.

Ponderosa pine forests are dependent upon natural fire to thin stands and eliminate younger aged-class trees. Past fire suppression has disrupted this cycle, allowing stands to develop unnaturally-high tree densities which greatly increase fire severity. Understory species of grasses, forbs, and shrubs have decreased in abundance due to competition for space, water, and nutrients. Kingman Field Office fire records show an average of 10 lightning-strike fires starting annually in ponderosa pine in the Hualapai Mountains. An average of 10 acres are burned annually. Fires are either limited to a single snag, or are suppressed by BLM firefighters. No large scale fire greater than 100 acres has been recorded for the ponderosa pine communities in the Hualapai Mountains.

Ponderosa pine has developed a number of adaptive traits to minimize damage from natural fire, including thick, exfoliating bark, deep roots, and self-pruning of lower branches. Natural fire frequency for these forests in Arizona and New Mexico is between approximately 5 and 12 years. Ponderosa pine is able to survive severe wildfires if natural fire occurs at these more frequent intervals. According to the BE, in two large fires (<50K acres) in Arizona, only those trees within previously fire-suppressed areas were destroyed. Fire suppression efforts have greatly decreased fire frequency in ponderosa pine forests, increasing the tree stand densities and decreasing grass/forb densities. Fire suppression has also increased the frequency of stand-replacing fires. Large, catastrophic stand-replacing fires burn with an intensity that kills existing vegetation and initiates forest succession or regrowth.

Status of the species within the action area

See "STATUS OF THE SPECIES", above, as the action area encompasses the known range of the subspecies.

Factors affecting the species' environment within the action area

See "STATUS OF THE SPECIES", above, as the action area encompasses the known range of the subspecies.

Because of the extent of Federal lands in the action area, most activities that may affect Hualapai vole or their habitat are Federal actions (i.e., BLM). The following provides a summary of the biological opinions that have been issued to date for the Hualapai vole. We refer the reader to these opinions for more detailed descriptions of these actions and their effects on the Hualapai vole and its habitat.

The Kingman Resource Area Resource Management Plan (RMP), as proposed in 1990, is a 20-year guide for management directions and programs within the resource area. The RMP provided for some integration of separate grazing and wilderness management plans to provide guidance for multiple-use management of the resource area. The Service issued a biological opinion (consultation number 2-21-91-F-089) on the proposed action on March 8, 1991, that

addressed the effects of the action on the Hualapai vole, peregrine falcon (*Falco peregrinus anatum*), bald eagle (*Haliaeetus leucocephalus*), and Arizona cliffrose (*Purshia subintegra*). The Service identified both adverse effects (i.e., mineral withdrawal, construction of an organized campground at Pine Flat, and continued recreational use, grazing, and wildlife management activities) and beneficial effects (i.e., development/revisions of allotment management plans to avoid and minimize effects of livestock grazing, confining utility corridors to existing rights-of-way, creation of an Area of Critical Environmental Concern on 3,000 acres of Hualapai vole habitat, and restriction of off-road vehicle use in washes) of the RMP on the Hualapai vole. However, no take was anticipated, or authorized, for any of the above species as a result of the administrative action of finalizing the RMP. The opinion further stated that as specific actions are implemented, those actions would need to go through the section 7 process and formal consultation if adverse affects were likely. The RMP was finalized in 1995.

On August 16, 1996, the Service issued a biological opinion regarding the effects of the Hualapai Mountain Ridge Road maintenance project on the Hualapai vole (consultation number 2-21-93-F-431). BLM proposed to conduct road maintenance activities to stabilize the roadbed and reduce erosion on the approximately 30 miles of Hualapai Mountain Ridge Road under the maintenance responsibility of BLM and roads associated with the Wild Cow Springs Recreation Site between 1995 and 2000. Road maintenance would result in less erosion impacts to adjacent habitat and fewer maintenance activities due to a more stabilized road surface. The maintenance activities themselves, however, may remove or substantially degrade Hualapai vole habitat, specifically where a culvert was to be replaced within an area known to be occupied by Hualapai voles. Also, the Service believed the road improvement would increase camping use in areas that were previously access-limited and facilitate the continued increase in visitor use of the road. The Service determined that the proposed action was not likely to jeopardize the continued existence of the vole. As a surrogate measure of take, we anticipated 150 square feet of vole habitat would be impacted during the installation of the culvert. In order to minimize take, the opinion included the following reasonable and prudent measures (RPMs): (1) disturbance due to culvert construction at T20N, R15W, S33 will be minimized; (2) unplanned components of the project that would occur in areas mapped as vole habitat or in vole habitat shall not be conducted; (3) material extracted or produced as a result of the project shall not be deposited in vole habitat; and (4) progress of the project shall be monitored by BLM and reported to the Service. No take of Hualapai vole has been reported to the Service as a result of this project; however, to date, the Service has not received the annual reports, as required by the incidental take statement.

The BLM formally consulted with the Service regarding the effects of the issuance of a 10-year grazing permit on the Yellow Pine Allotment to the Hualapai vole. The biological opinion was issued on February 25, 1999 (consultation number 2-21-98-F-304). Approximately 25 to 30 percent of all documented Hualapai vole locations in the Hualapai Mountains are located within this allotment. Direct effects of the action may include competition for forage, removal of cover resulting in increased exposure to predators and the environment (i.e., extremes in temperature and humidity), and trampling of runways, nests, food caches, and burrows. The Service

determined that the proposed action was not likely to jeopardize the continued existence of the vole. Take of the Hualapai vole was anticipated as a result of the proposed action. The Service determined that take would be exceeded if (1) remedial actions are not implemented during the first non-grazing season following the damage of the less than 6.0-acre "heavy impact" area of vole habitat, and/or (2) monitoring shows utilization of key forage species in excess of 20 percent within any of the "low to moderate impact" areas of vole habitat, which totals less than 13.5 acres. In order to minimize take, the opinion included the following RPMs: (1) livestock grazing impacts on voles and their habitat shall be minimized; (2) BLM will continue surveys for voles in potential habitat and new sites will be afforded the same conservation considerations as currently known sites; and (3) progress of the project, including effectiveness of the conservation actions and level of incidental take, will be monitored by BLM and reported to the Service. A report discussing use levels, exclosure construction, and vole surveys is completed and submitted to the Service annually. To date, four fences have been constructed to exclude livestock from vole habitat and forage use limit of 20 percent in unprotected vole habitat has not been exceeded.

In addition to the above formal consultation, several informal consultations have resulted in either no effect, a beneficial effect, or were not likely to adversely affect the Hualapai vole. Those actions that have had, or are having, beneficial effects are summarized below:

- The Hualapai Mountain Research Natural Area of Critical Environmental Concern (ACEC) was established in the 1995 Kingman Resource Area Resource Management Plan. This area is comprised of four separate parcels totaling approximately 3,600 acres located on the north-facing slopes of upper Hibernia Canyon, upper Bull Canyon, Upper Antelope Wash, and the north-facing slopes of upper Cedar Wash/South-facing slopes of Upper Blue Tank Wash. The goal of this ACEC is to provide optimal habitat for viable populations of Hualapai vole.
- In 1998, the Hualapai Mountain Land Exchange acquired 330 acres of Hualapai vole habitat from private ownership and incorporated it into the existing ACEC (consultation number 2-21-98-I-324). No Hualapai vole habitat was changed to private ownership through this exchange.
- Hibernia Allotment This allotment is divided into two seasonal pastures. The mountain pasture in the higher elevations of the allotment is grazed from October through April. Nearly all of the ponderosa pine habitat has been excluded from livestock use by the Pine Flat Exclosure, which also protects Hualapai vole habitat (consultation number 2-21-92-I-708). Livestock grazing in the unfenced, potential Hualapai vole habitat at the head of Bull Canyon is restricted because of rough terrain and the current fall-winter grazing system.
- La Cienega Allotment Hualapai vole habitat found in the Pine Peak area of this allotment has been protected from livestock by the Pine Peak Fence (consultation number 2-21-96-I-040).
- Walnut Creek Allotment Currently there is only one Hualapai vole location on this allotment, approximately 1/4 mile southeast of Wabayuma Spring. This area, north of

Wabayuma Peak, is the only potential habitat on the allotment. Livestock access to this spring and nearby potential and suitable Hualapai vole habitat is very unlikely due to its thick chaparral vegetation and steep slopes. A stipulation in the ten-year permit requires that the livestock trough, which is fed by pipeline from Wabayuma Spring, be turned off from April 1 to September 30, making the area even more unsuitable for livestock grazing (consultation number 2-21-96-I-440).

IV. EFFECTS OF THE ACTION

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

Treatment areas would be scattered annually throughout the action area. Implementation of the proposed action will depend on weather conditions and availability of fire fighters. It is very unlikely that the same stand will be burned more than once within the life of the project, since the intended burn frequency is 10-years in ponderosa pine and a minimum of 10-years for chaparral. The treatment of a particular area lasts approximately two to three days.

The action area virtually encompasses the range of the Hualapai vole. Occupied vole habitat is scattered throughout the action area. Although riparian areas, seeps, and springs (regardless of whether they are occupied by voles or not) and areas occupied by voles are proposed to be avoided, they may be adjacent to or surrounded by unoccupied ponderosa pine or chaparral that is targeted for treatment.

The proposed action is likely to have adverse effects to the Hualapai vole through (1) injury and/or death during the treatment from smoke inhalation and/or fire and (2) harm, injury, and/or death after treatment due to temporary loss or degradation of habitat and increased predation. The proposed action is also likely to have beneficial effects to the vole by (1) increasing the suitability of currently unoccupied areas as the undergrowth returns within 2-4 years of treatment and (2) reducing the potential for catastrophic wildfires. BLM proposes several conservation measures to avoid and minimize the potential for adverse effects. These measures are likely to minimize much of the potential for adverse impacts to Hualapai voles and their habitat; however, they do not completely eliminate the potential for take.

Prescribed burns typically have only minor impacts to watersheds as surface vegetation, litter, and the forest floor are only partially burned; other resources (e.g., wildlife, vegetation, soils) are also relatively unimpacted by prescribed fire (DeBano *in* Ffolliott *et al* 1996). Conservation measures proposed by BLM are likely to minimize adverse effects on the vole by avoiding treatment of occupied vole habitat and restricting off-road vehicle use to areas outside of potential or suitable vole habitat. Additional conservation measures will create firebreaks around

occupied areas and precision ignition will be used under appropriate weather conditions and should effectively protect most of the occupied vole habitat.

How much of the area to protect, however, is a question that cannot be fully answered given the lack of data on Hualapai vole use area or home range. A protected area may not encompass the entire use area (e.g., may inadvertently exclude important forage areas) which may result in increased intraspecific competition for resources in the area until the area recovers.

Voies may range beyond the protected area and would be vulnerable to death or injury, either through contact with the fire or from smoke inhalation, if they were not able get back to a protected area during the treatment. In general rodents can escape fire by running ahead of the flames and/or taking refuge in unburned areas, rock outcroppings, or burrows (Higgins *et al.* 1989). The proposed treatment timing overlaps with the last few months of the suspected breeding season of *M. mexicanus* (approximately May through November). It is possible that pregnant voles, newborns in the nest, and very young voles may be present during the time of treatment and are less likely to escape if they are not within protected areas, leaving them more vulnerable to injury or death.

It may take 2-4 years for the community to provide the necessary vegetation composition and structure suitable for use by voles (Higgins *et al.* 1989). Vegetative cover provides *Microtus* spp. with concealment and protection from predators (Rose and Birney 1985). For small mammals, Higgins *et al.* (1989) consider predation to be “[a]n immediate, indirect cause of mortality from burning.” The proposed action may increase predation on voles in occupied habitat adjacent to or surrounded by treated areas until sufficient cover has returned.

If properly implemented, prescribed burning should assist in returning the community to a more natural composition and structure and reduce hazardous fuel load levels. Initially, the burned areas are not likely to provide suitable habitat for vole. When sufficient forage and cover have accumulated, previously unoccupied areas may become suitable, allowing Hualapai voles to shift or potentially expand their current distribution. Hoffmeister (1986) reports that during a 1953 trapping survey on Escudilla Mountain in Apache County, Arizona, where parts of the forest had burned a few years earlier, microtines (i.e., *M. mexicanus*, *M. logicaudus*, and *M. montanus*) were “obviously abundant.” He noted 20 to 30 live animals in one afternoon. During the 1953 survey, abundance of voles was measured within a 6-foot diameter circle resulting in the discovery of 21 burrow entrances. Hoffmeister (1986) further reports that, although grass was “not exceedingly thick,” runways within the burned area were present. He concluded that the voles had “reinvaded this area since the fire and were taking refuge beneath downed timber.”

Rose and Birney (1985) report that after a forest is cut, herbaceous species tend to dominate for a few years and create a habitat in which the small mammal community is often dominated by one or more species of *Microtus*. They cite that a similar response in the small mammal community was observed after a forest fire in Minnesota. Higgins *et al.* (1989), however, report *Microtus* populations in the Northern Great Plains are typically low for the first 2-4 years after fire due to

lack of food and cover. The primary factors in the shifts and fluctuations of small mammal populations are food and habitat resources (Higgins *et al.* 1989). As the burned area undergoes the succession of recovery, the various aspects of the community (e.g., flora, fauna, litter accumulation, soils, hydrology) will eventually return to preburn conditions (Higgins *et al.* 1989, Baldys and Hjalmarson 1994, Sackett *in* Ffolliott *et al.* 1996).

V. CUMULATIVE EFFECTS

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

BLM expects recreational use of the Hualapai Mountains to increase slightly in the future. Future housing development and property maintenance (e.g., hazardous fuel load reduction) is likely to occur on private lands within and adjacent to Hualapai vole occupied, suitable, and potential habitat. BLM has management authority and responsibility for recreational impacts on the lands they manage. However, recreational and other impacts on the Hualapai Mountain County Park and private lands within the action area may affect the Hualapai vole as well, and may not be related to any Federal action.

VI. CONCLUSION

After reviewing the current status of the Hualapai Mexican vole, the environmental baseline for the action area, the effects of the proposed prescribed burn program, and the cumulative effects, it is the Service's biological opinion that the implementation of the prescribed burn program within action area, as proposed, is not likely to jeopardize the continued existence of the Hualapai Mexican vole. No critical habitat has been designated for this species, therefore, none will be affected.

We base this conclusion on the following considerations:

1. The number of Hualapai voles anticipated to be affected by the proposed action is not expected to have a significant effect on the species' overall numbers, distribution, or reproductive potential.
2. The direct and indirect impacts of the proposed action have been minimized through project conservation measures.
3. The proposed action is likely to increase the amount of suitable habitat within the subspecies' range within 2-4 years after treatment.
4. The proposed action is likely to reduce the potential for severe, stand-altering wildfires.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the BLM so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The BLM has a continuing duty to regulate the activity covered by this incidental take statement. If the BLM (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant 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 BLM 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)]

I. AMOUNT OR EXTENT OF TAKE

The Service anticipates incidental take of Hualapai Mexican voles in the form of harm due to loss of foraging habitat. Take will be difficult to detect for the following reasons: (1) voles have small body size; (2) finding a dead or impaired specimen is unlikely; (3) losses may be masked by seasonal fluctuations in numbers or other causes; and (4) the species occurs in habitat that makes detection difficult. As a surrogate measure of take, we anticipate that no more than 100 acres of ponderosa pine will be burned annually for the next 10 years, resulting in a temporary loss of foraging habitat for the vole. The level of take of this species can be considered to be exceeded if the following occur: (1) treatment escapes into occupied vole habitat or (2) greater than 100 acres of ponderosa pine is treated during any annual burn season.

II. EFFECT OF TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species.

III. REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize impacts of incidental take of the Hualapai Mexican vole:

1. Minimize the effects of the prescribed fire on the Hualapai Mexican vole.
2. Minimize temporary and long-term impacts to treated sites and the adjacent habitat.

IV. TERMS AND CONDITIONS

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

1. The following terms and conditions implement reasonable and prudent measure number one:
 - 1.1 BLM shall determine the use area of occupied Hualapai vole habitat, to the maximum extent practicable based on vole sign and clearly delineate the use area as an area to be avoided. Treatment (fire or mechanical), construction of fire breaks, and/or staging areas for treatment shall not be located within a vole use area.
 - 1.2 BLM shall provide the Service with the results of Hualapai vole presence/absence surveys and a description and map of the areas intended to be treated during the current burn season at least 30 days prior to the beginning of each burn season (September 1) for the life of the project. Site maps should indicate any identified vole use areas, the buffer areas (i.e., 200 feet between September 1 and December 1, 100 feet between December 1 and March 15) and a description of how the area was defined based on vole signs. Because the ability to implement a prescribed burn is highly dependent on factors (e.g., weather) that are not entirely predictable, BLM may need to alter burn plans and/or propose additional treatment areas after August 1. In these circumstances, BLM shall provide the above information to the Service as soon as such alterations or additions are made, preferably at least 30 days prior to the proposed ignition date.
 - 1.3 A follow-up report shall be provided by BLM to the Service on or before May 15; that is, within 60 days of the end of the burning season (March 15). This report shall summarize the results of all treatments conducted in the action area during the burn season and provide a description of how the conservation measures and terms and conditions of this biological opinion were implemented.

2. The following terms and conditions implement reasonable and prudent measure number two:
 - 2.1 BLM shall provide a 75- to 100-foot, minimum, unburned vegetation buffer between treatment sites and riparian and dry wash areas to decrease erosion into and sedimentation of the occupied or potentially occupied vole habitat. Within ponderosa pine treatment sites, use of a dry washes as a fire line may be appropriate and result in less disturbance than construction of a cup trench above the wash. Under such circumstances, BLM shall prepare the wash as a fire line by raking of duff and hand removal of dead branches and other debris.
 - 2.2 BLM shall provide an annual report to the Service describing the results of the annual monitoring of treated sites. This report may be incorporated into either the pre-burn season report (see 1.3, above) or with the post-burn season report (see 1.4, above), depending on when monitoring occurs.

Disposition of Dead or Injured Listed Animals

Upon finding 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 (480/835-8289) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, 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 as soon as possible to this office or the nearest AGFD office, educational, or research institutions (e.g., Arizona State University in Tempe) holding appropriate State and Federal permits.

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

CONSERVATION RECOMMENDATIONS

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

1. We recommend that, in addition to photo-point monitoring of treated sites in the Hualapai Mountains, BLM also design a study to determine if and when voles move into the treated areas. Additionally, we recommend that the study be designed to compare pre-burn population distribution to post-burn distribution to determine whether Hualapai vole locations have shifted or increased their range into treated areas.

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

REINITIATION NOTICE

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

The Service appreciates your coordination on this project. For further information, please contact Stefanie Barrett (x230) or Debra Bills (x239).

/s/ David L. Harlow

cc: Regional Director, U.S. Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Director, Department of Natural Resources, Hualapai Tribe, Peach Springs, AZ

John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

LITERATURE CITED

- Baldys, S. and H.W. Hjalmarson. 1994. Effects of controlled burning of chaparral on streamflow and sediment characteristics, East Fork Sycamore Creek, Central Arizona. U.S. Geological Survey Water-Resources Investigations Report 93-4102, Tucson, Arizona. 33 pp.
- Boyett, W.D. 2001. Habitat relations of rodents in the Hualapai Mountains of northwestern Arizona. Unpublished M.S. Thesis, University of Wisconsin Oshkosh, Oshkosh, WI. 75 pp.
- Busch, J.D., D.L. Greenberg, B. Wade, T. Theimer, P. Keim. 2001. Hualapai vole (*Microtus mogollonensis hualpaiensis*) genetic analysis. Unpublished final report to Arizona Game and Fish Department by the Department of Biological Sciences, Northern Arizona University, Flagstaff, Arizona. 25 pp.
- DeBano, L.F., P.F. Ffolliott, and M.B. Baker, Jr. 1996. Fire severity effects on water resources. In Ffolliott, P.F., L.F. DeBano, M.B. Baker, G.J. Gottfried, G. Solis-Garaza, C.B. Edminster, D.G. Neary, L.S. Allen, R.H. Hamre, tech. coordinators. 1996. Effects of fire on Madrean Province Ecosystems - A symposium proceedings. March 11-15, 1996; Tucson, AZ. General Technical Report RM-GTR-289. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 277 pp.
- Frey, J.K. 1989. Morphologic variation in the Mexican vole (*Microtus mexicanus*). Unpublished M.S. thesis, Emporia State University, Emporia, Kansas. 105 pp.
- Frey, J.K. and C.T. LaRue. 1993. Notes on the distribution of the Mogollon vole (*Microtus mogollonensis*) in New Mexico and Arizona. Southwestern Naturalist 38:176-178.
- Frey, J.K. and T.L. Yates. 1995. Hualapai vole (*Microtus mogollonensis hualpaiensis*) genetic analysis. Unpublished final report to Arizona Game and Fish Department by the Museum of Southwest Biology, Albuquerque, New Mexico. 41 pp.
- Getz, L.L. 1985. Habitats. Pages 286-309 in R.H. Tamarin, editor. Biology of New World *Microtus*. American Society of Mammalogists, Special Publication Number 8.
- Higgins, K.F., A.D. Kruse, and J.L. Piehl. 1989. Effects of fire in the Northern Great Plains. U.S. Fish and Wildlife Service and Cooperative Extension Service, South Dakota State University, Northern Prairie Wildlife Research Center Home Page. <http://npwrc.usgs.gov/resource/2000/fire/fire.htm> (version 16MAY2000).
- Hoffmeister, D.F. 1986. Mammals of Arizona. Arizona Game and Fish Department and University of Arizona Press, Tucson, Arizona. 602 pp.
- Keller, B.L. 1985. Reproductive Patterns. Pages 725-778 in R.H. Tamarin, editor. Biology of New World *Microtus*. American Society of Mammalogists, Special Publication Number 8.

- Kime, K.A., W.E. Van Pelt, and D.W. Belitsky. 1994. A status review of the Hualapai Mexican vole in northwestern Arizona. Nongame and Endangered Wildlife Program Technical Report 42. Arizona Game and Fish Department, Phoenix, Arizona.
- Kime, K.A., W.E. Van Pelt, and D.W. Belitsky. 1995. The Hualapai Mexican vole in northwestern Arizona: 1990-1995 field investigations. Nongame and Endangered Wildlife Program Technical Report 75. Arizona Game and Fish Department, Phoenix, Arizona.
- Rose, R.K., and E.C. Birney. 1985. Community Ecology. Pages 310-339 in R.H. Tamarin, editor. Biology of New World *Microtus*. American Society of Mammalogists, Special Publication Number 8.
- Sackett, S.S., S.M. Haase, and M.G. Harrington. 1996. Prescribed burning in Southwestern ponderosa pine. In Ffolliott, P.F., L.F. DeBano, M.B. Baker, G.J. Gottfried, G. Solis-Garaza, C.B. Edminster, D.G. Neary, L.S. Allen, R.H. Hamre, tech. coordinators. 1996. Effects of fire on Madrean Province Ecosystems - A symposium proceedings. March 11-15, 1996; Tucson, AZ. General Technical Report RM-GTR-289. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. 277 pp.
- Spicer, R.B., R.L. Glinski, and J.C. deVos, Jr. 1985. (Revised 1986). Status of the Hualapai vole (*Microtus mexicanus hualpaiensis* Goldman). Unpublished report to U.S. Fish and Wildlife Service by Arizona Game and Fish Department, Phoenix, Arizona. 49 pp.
- U.S. Fish and Wildlife Service. 1991. Hualapai Mexican Vole Recovery Plan. Albuquerque, New Mexico. 28 pp.