

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:

January 10, 2007

AESO/SE
22410-2006-F-0441

Mr. Jerome Mastel
Pleasant Valley Ranger District
Post Office Box 450
Young, Arizona 85554

RE: 500-3 500 kV Arizona Public Service (APS) and Salt River Project (SRP) Vegetation Clearance Project on the Pleasant Valley Ranger District, Tonto National Forest, Arizona

Dear Mr. Mastel:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated December 27, 2006, and received by us on January 4, 2007. At issue are impacts that may result from the 500-3 500 kV APS and SRP vegetation clearance project on the Pleasant Valley Ranger District of the Tonto National Forest (TNF) located in Gila County, Arizona. The proposed action may affect the threatened Mexican spotted owl (*Strix occidentalis lucida*) (MSO) and its designated critical habitat. We concur with your determination on "may affect, not likely to adversely affect" for the threatened Chiricahua leopard frog (*Rana chiricahuensis*) (CLF) and provide our concurrence at the end of this document (Appendix A).

This biological opinion is based on information provided in the December 27, 2006, biological assessment and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

- May 24, 2006. APS and TNF submitted a biological assessment for consultation seeking concurrence for MSO and CLF.
- June 8, 2006. FWS wrote a letter to TNF seeking more information in order to evaluate the project.

- September 12, 2006. APS sent an electronic transmission with a revised draft of the biological assessment seeking comments. SRP was added as a participant in the project.
- September 18, 2006. APS sent an amended electronic transmission of the revised draft biological assessment seeking comments.
- October 3, 2006. FWS sent an electronic transmission to TNF and APS with comments and questions on the updated draft.
- October 11, 2006. FWS sent an electronic transmission to APS and TNF requesting a few additional details, including an official letter requesting consultation.
- November 8, 2006. FWS provided APS and TNF a report on CLF reintroduction near the project site to add to the analysis.
- November 28, 2006. FWS sent an electronic transmission to APS and TNF summarizing the history and current status of the project. We reiterated the need for an official letter to initiate consultation.
- December 12, 2006. TNF received a letter from APS and SRP requesting emergency consultation.
- December 13-18, 2006. TNF, APS, and FWS exchanged electronic transmissions and held conference calls to get additional site specific information about the project and refine the project description. Emergency consultation was determined to not be a viable option by TNF and FWS.
- December 27, 2006. FS requested formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Project Description

The 500-3 consists of two parallel, high-voltage transmission lines that supply electricity to the Phoenix metropolitan area as well as to the Western Power Grid for 11 western states. The power line on the east side of the ROW ("500-3") is owned and operated by APS, whereas the line on the west ("Coronado to Silver King") is owned and operated by SRP. Both lines share a common 500-foot-wide ROW and are collectively referred to as the 500-3.

To continue the delivery of electricity in a safe and reliable manner, APS and SRP propose a combined treatment of 2,600 acres (along 34 miles) in the existing ROW using manual and mechanical methods of vegetation management. However, the number of acres treated is an overestimate because portions of the project area include slopes, valleys, washes, and canyons

where the powerline is high enough above the ground such that vegetation clearing under the line is not necessary. Affected vegetation will include ponderosa pine, Gambel oak, pinyon pine, one-seed juniper, and to a lesser extent, Utah juniper, shrub live oak, and pointleaf manzanita. This project is proposed to take approximately seven months to complete (January through July 2007). All activities will occur on Forest Service lands.

Based on the vegetation management prescription, the Utility Vegetation Management document (APS 2006), clearance activities would entail cutting trees to near ground level beneath the power lines and within 50 feet of either side of the outside conductors. The low (sag) point of the line (typically the center 1/3) would also be cleared of trees and shrubs. Additionally, vegetation within a 40-foot radius of tower bases would be cleared to bare ground, thereby providing a fire break should a wildfire occur beneath the power line.

APS and SRP will cut in accordance with diagrams submitted to the USFS (refer to Appendix B), and would proceed in accordance with master special use permits for APS and SRP, respectively, as well as by the following standards: OSHA-1910.269; ANSI-Z133.1; ANSI-A300; Arizona Revised statutes 40-360.41-45; National Electric Safety Code; Edison Electric Institute's strategy on environmental stewardship; and the Uniform Fire Code for vegetation clearances in and around power lines. The project will remove trees, side-prune branches, and clear around power poles and other structures to reduce the height of vegetation within required clearance zones.

In most of the project area, certified tree workers would use hand tools (chain saws, hand saws) to cut branches and trunks of tall-growing species and then lop and scatter the slash in an appropriate manner, in consideration of adjoining land uses, terrain, aesthetics, fire concerns, etc. Slash and logs less than 9 inches diameter will be lopped and scattered throughout the immediate area in a manner such that debris lies within 18-24 inches of the ground. Stumps will not exceed 6 inches in height and be cut flat. Where practicable, logs over 9 inches diameter will be removed from the power line corridor and placed at the edge of the corridor. No slash will be placed within 25 feet of the high mark of streams or other bodies of water.

APS has selected three specific areas for treatment by a commercial mower (Appendix B, Figure 4). Factors such as topography, habitat, and the absence of cultural resources make these areas suitable for clearance by a mower and reduce the amount of time required to complete the proposed action. These mow areas are relatively close to one another and only include the APS portion of the project area. The mow areas occur east and north of Gentry Mountain near the Forest boundary and would account for approximately 20 percent of the project area. Area 1, which includes 223 acres, begins approximately 5 miles south of highway 260 and 0.5 mile west of the Young Highway at structure number 62-2 and ends at 66-1. Area 2, which includes 63 acres, begins at structure 67-2 and ends at FR 101. Area 3, which includes 151.5 acres, begins at structure number 70-2 and ends at the canyon south of structure 72-3. Two trucks/chippers would also be used in all three mower areas to chip and disperse slash.

To access the project area, crews would use established roads only (Young Highway, FR 411C, 128, 104, 102, and existing maintenance roads in the ROW) and would create no new roads or staging areas. South of where Young Highway crosses the power line at Lost Tank Ridge, crews

would continue to travel on ROW maintenance roads as well as FR 101, 100, 202, 127A. If no road is available or if an existing road could be damaged by large vehicles during inclement weather, crews would transport tools to the ROW on foot. Appropriate hand tools and backpack sprayers would be on site should a fire result from clearance activities.

The transmission line and associated ROW occurs within MSO critical habitat and is about 0.25 mile east of the Colcord protected activity center (PAC) and crosses the eastern end of the Gentry PAC. A total of 727 acres (12 miles) of the action area falls within the MSO critical habitat boundary, of which a total of 595.5 acres (or the northernmost 8.75 miles) is comprised of PACs, protected steep-slope, and restricted habitat. The remaining 131.5 acres within the MSO critical habitat boundary do not fall within a PAC or meet the definition of protected steep-slope and restricted habitat, as defined in the Recovery Plan. Therefore, only 595.5 acres of MSO critical habitat will be evaluated for this consultation.

The ultimate goal for ROW management is to convert the treated ROW to low-growing plant communities that preclude the growth of tall-growing vegetation. This approach would allow APS and SRP to manage tall-growing vegetation in the most efficient manner possible while reducing associated impacts to other species.

Long-term vegetation maintenance and management is expected to be proposed and evaluated under a future programmatic biological opinion covering all utility ROW clearance projects on all Arizona National Forest Lands. That project is anticipated to begin in 2009.

Project Area

The project area runs north-south from Naegelin Canyon near the Mogollon Rim along the eastern boundary of Tonto National Forest to Boulder Spring near Sombrero Peak (Appendix B, Figure 1). The project area extends for approximately 34 miles and includes approximately 2,060 acres (34 miles x 500 feet of Right of Way [ROW] x 5,280 feet per mile divided by 43,560 feet per acre). Elevation varies from 7,200 feet at the north end to 3,900 feet at the south end. The northern half of the project area is coniferous forest with a large number of ponderosa pines and fewer Gambel oaks. The southern portion is coniferous woodland with a large number of pinyon pines, one-seed junipers, and Utah junipers.

The Action Area

The action area represents all areas to be affected directly or indirectly by the action, including areas affected by interrelated or interdependent activities. For the 500-3 project, the action area is expected to be wider than the footprint of the project area. The footprint of the project area includes the 500 foot ROW, the roads traveled by vehicles approaching and leaving the ROW, and any location outside of the ROW to where downed vegetation may be moved. However, indirect effects to species outside of the project footprint may occur and will be evaluated in areas where owls may be disturbed by noise or other effects, such as in PACs, critical habitat, and/or steep slope habitat.

Conservation Measures

APS and SRP propose to implement conservation measures to reduce and minimize effects of the action. The 500-3 power lines will span over canyons and other riparian areas, however no vegetation removal (i.e. cottonwood, willow, etc.) will be required in riparian areas. To minimize effects to the landscape, 80 percent of the vegetation removal will be conducted by certified tree crews using hand tools only (chainsaws, hand saws). These crews will work in the project area on foot, and will travel on existing roads only. The remaining 20 percent of the project area will be cleared by a commercial mower, which would reduce vegetation to ground level.

APS and SRP also propose to implement seasonal restrictions in order to not disturb nesting MSOs by avoiding any vegetation clearing or disposal from March 1st to August 31st, within 0.25 mile of the Gentry or Colcord PAC. In other words, work will be conducted adjacent to the Colcord and Gentry PACs and within MSO critical habitat from sometime in January to March 1, 2007, to avoid the MSO nesting season. The transmission line spans Gentry Canyon within the Gentry PAC for 0.75 mile. The power lines cross the canyon high enough that vegetation need not be removed within the PAC except for a few pinyon pines and junipers 50 feet away from the edge of the canyon.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Mexican spotted owl

The MSO was listed as a threatened species in 1993 (USDI 1993) and critical habitat was most recently designated in 2004 (USDI 2004). The primary threats to the species were cited as even-aged timber harvest and catastrophic wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the MSO population. The FWS appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (USDI 1995).

A detailed account of the taxonomy, biology, and reproductive characteristics of the MSO is found in the Final Rule listing the MSO as a threatened species (USDI 1993) and in the Recovery Plan (USDI 1995). The information provided in those documents is included herein by reference. Although the MSO's entire range covers a broad area of the southwestern United States and Mexico, the MSO does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern United States and Mexico.

The U.S. range of the MSO has been divided into six recovery units (RU), as discussed in the Recovery Plan. The Upper Gila Mountains RU, in which the 500-3 vegetation clearance project is located, is a relatively narrow band bounded on the north by the Colorado Plateau RU and to the south by the Basin and Range-West RU. The southern boundary of this RU includes the drainages below the Mogollon Rim in central and eastern Arizona. The eastern boundary

extends to the Black, Mimbres, San Mateo, and Magdalena mountain ranges of New Mexico. The northern and western boundaries extend to the San Francisco Peaks and Bill Williams Mountain north and west of Flagstaff, Arizona. This is a topographically complex area consisting of steep foothills and high plateaus dissected by deep, forested drainages. This RU can be considered a "transition zone" because it is an interface between two major biotic regions: the Colorado Plateau and Basin and Range Provinces (Wilson 1969). The Kaibab, Coconino, Apache-Sitgreaves, Tonto, Cibola, and Gila National Forests administer most habitats within this RU. The north half of the Fort Apache and northeastern corner of the San Carlos Indian reservations are located in the center of this RU.

Historical and current anthropogenic uses of MSO habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of MSO nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season.

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, severe, stand-replacing wildfire is probably the greatest threat to MSO within the Upper Gila Mountains. As throughout the West, fire severity and size have been increasing within this geographic area. The table below shows several stand-replacing fires that have had a large influence on MSO habitat in this RU in the last decade. Obviously the information in the table is not a comprehensive analysis of fires in the Upper Gila Mountains RU or the effects to MSO. However, the information does illustrate the influence that stand-replacing fire has on current and future MSO habitat in this RU. This list of fires alone estimates that approximately 11 percent of the PAC habitat within the RU suffered high- to moderate-intensity, stand-replacing fire in the last seven years.

A reliable estimate of the numbers of owls throughout its entire range is not available (USDI 1995) and the quality and quantity of information regarding numbers of MSO vary by source. USDI (1991) reported a total of 2,160 owls throughout the United States. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico. However, Ganey *et al.* (2000) estimates approximately $2,950 \pm 1,067$ (SE) MSOs in the Upper Gila Mountains RU alone. The Forest Service Region 3 most recently reported a total of approximately 989 PACs established on National Forest lands in Arizona and New Mexico (USDI 2005). The Forest Service Region 3 data are the most current compiled information available to us; however, survey efforts in areas other than National Forest System lands have resulted in additional sites being located in all Recovery Units.

Researchers studied MSO population dynamics on one study site in Arizona ($n = 63$ territories) and one study site in New Mexico ($n = 47$ territories) from 1991 through 2002. The Final Report, titled "Temporal and Spatial Variation in the Demographic Rates of Two Mexican Spotted Owl Populations," (*in press*) found that reproduction varied greatly over time, while survival varied little. The estimates of the population rate of change ($\Lambda = \text{Lamda}$) indicated that the Arizona population was stable (mean Λ from 1993 to 2000 = 0.995; 95% Confidence Interval = 0.836, 1.155) while the New Mexico population declined at an annual rate of about 6% (mean Λ from 1993 to 2000 = 0.937; 95% Confidence Interval = 0.895, 0.979). The study concludes that spotted owl populations could experience great (>20%) fluctuations in numbers from year to

year due to the high annual variation in recruitment. However, due to the high annual variation in recruitment, the MSO is then likely very vulnerable to actions that impact adult survival (e.g., habitat alteration, drought, etc.) during years of low recruitment.

Some recent influential fires within the Upper Gila Mountains Recovery Unit, approximate acres burned, number of PACs affected, and PAC acres burned.

Fire Name	Year	Total Acres Burned	# PACs Burned	# PAC Acres Burned
Rhett Prescribed Natural Fire	1995	20,938	7	3,698
Pot	1996	5,834	4	1,225
Hochderffer	1996	16,580	1	190
BS Canyon	1998	7,000	13	4,046
Pumpkin	2000	13,158	4	1,486
Rodeo-Chediski	2002	462,384	55	~33,000
TOTAL		525,894	84	~43,645

Since the owl was federally-listed, we have completed or have in draft form a total of 177 formal consultations for the MSO. These formal consultations have identified incidences of anticipated incidental take of MSO in 370 PACs. The form of this incidental take is almost entirely harm or harassment. These consultations have primarily dealt with actions proposed by the Forest Service, Region 3. However, in addition to actions proposed by the Forest Service, Region 3, we have also reviewed the impacts of actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management-ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only two of these projects (release of site-specific owl location information and implementation of then-existing forest plans) have resulted in biological opinions that the proposed action would likely jeopardize the continued existence of the MSO.

In 1996, we issued a biological opinion on Region 3 of the Forest Service adoption of the Recovery Plan recommendations through an amendment to their Land and Resource Management Plans (LRMPs). In this non-jeopardy biological opinion, we anticipated that approximately 151 PACs would be affected by activities that would result in incidental take of MSOs, with approximately 91 of those PACs located in the Upper Gila Mountains RU. In addition, on January 17, 2003, we completed a reinitiation of the 1996 Forest Plan Amendments biological opinion, which anticipated the additional incidental take of five MSO PACs in Region 3 due to the rate of implementation of the grazing standards and guidelines, for a total of 156 PACs. Consultation on individual actions under these biological opinions resulted in the harm

and harassment of owls associated with approximately 243 PACs on Region 3 National Forest System Lands. Region 3 of the Forest Service reinitiated consultation on the LRMPs on April 8, 2004. On June 10, 2005, the FWS issued a revised biological opinion on the amended LRMPs. We anticipated that while the Region 3 Forests continue to operate under the existing LRMPs, take is reasonably certain to occur in an additional 10 percent of the known PACs on Forest Service lands. We expect that continued operation under the plans will result in harm to owls in 49 PACs and harassment in another 49 PACs. To date, consultation on individual actions under the amended Forest Plans, as accounted for under the June 10, 2005, biological opinion has resulted in 24 PACs adversely affected (owls associated with 14 PACs harmed and owls associated with 10 PACs harassed), with 10 of those PACs in the Upper Gila Mountains RU

Mexican spotted owl critical habitat

The final MSO critical habitat rule (USDI 2004) designated approximately 8.6 million acres of critical habitat in Arizona, Colorado, New Mexico, and Utah, mostly on Federal lands (USDI 2004). Within this larger area, critical habitat is limited to areas that meet the definition of protected and restricted habitat, as described in the Recovery Plan. Protected habitat includes all known owl sites and all areas within mixed conifer or pine-oak habitat with slopes greater than 40 percent where timber harvest has not occurred in the past 20 years. Restricted habitat includes mixed conifer forest, pine-oak forest, and riparian areas outside of protected habitat. There are 13 critical habitat units located in the Upper Gila Mountains RU that contain 3.1 million acres of designated critical habitat.

The primary constituent elements for MSO critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (USDI 1995). Since owl habitat can include both canyon and forested areas, primary constituent elements were identified in both areas. The primary constituent elements which occur for the MSO within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the MSO's habitat needs for nesting, roosting, foraging, and dispersing are in areas defined by the following features for forest structure and prey species habitat:

Primary constituent elements related to forest structure include:

- A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30% to 45% of which are large trees with dbh of 12 inches or more;
- A shade canopy created by the tree branches covering 40% or more of the ground; and,
- Large, dead trees (snags) with a dbh of at least 12 inches.

Primary constituent elements related to the maintenance of adequate prey species include:

- High volumes of fallen trees and other woody debris;
- A wide range of tree and plant species, including hardwoods; and

- Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

The forest habitat attributes listed above usually are present with increasing forest age, but their occurrence may vary by location, past forest management practices or natural disturbance events, forest-type productivity, and plant succession. These characteristics may also be observed in younger stands, especially when the stands contain remnant large trees or patches of large trees. Certain forest management practices may also enhance tree growth and mature stand characteristics where the older, larger trees are allowed to persist.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

The entire project area exists within the Pleasant Valley Ranger District of the Tonto National Forest. As a result, multiple uses such as recreation and use of natural resources for purposes such as cattle grazing or timber occur. The boundary of the project footprint is unusual because it is largely restricted to a 500-foot wide corridor across 34 miles of the TNF.

Clearing of this ROW in the 1970s initially altered this landscape. However slowly over the last 30 plus years, the forest has re-grown in some areas. APS and SRP have completed some vegetation management in the ROW since the line was constructed. In 1997, APS cleared vegetation in the low sag (mid-span) area directly beneath the lines, within 25 feet of the outside conductors, as well as tall-growing vegetation within 17 feet of energized line, towers, and guy wires. In 1997 and 1998, SRP cleared a large number of trees from its half of the ROW (consultation number 02-21-97-F-0356). In 1999, APS cleared less than a mile of ROW before TNF requested review of the operations. In 2005, APS removed hazard trees from the 34-mile length of the ROW.

Like most forested land in Arizona, there is concern for the overall forest health as a result of past actions over many years. The results of land management choices such as timber harvest, fire suppression, cattle grazing, etc. have created conditions that have caused the forest to be more susceptible to catastrophic fire. As a result, the TNF has been engaged in treatment to reduce fuel, improve forest health, and reduce the risk of catastrophic fire.

Within the action area and immediately west of the northern portion of the ROW, we completed consultation in 2005 (consultation number 02-21-05-F-0380) on the Salt Analysis Area (8,200 acres). Prior to completion of consultation 480 acres were harvested of which 262 acres (of which 207 trees were greater than 18 inches in diameter) were within MSO restricted habitat. A total of 2,400 acres of MSO critical habitat is within the Salt Analysis Area, and about 562 acres were treated. The Colcord PAC is within 0.5 mile of the eastern end of the Salt Analysis Area.

Following the 500 kV line south and below the Salt Analysis Area, is the Rose Timber Sale (consultation number 02-21-91-I-0544) and subsequent Red Cherry Timber Sale (consultation number 02-21-93-I-0277) and Ridge Timber Sale (consultation number 02-21-93-I-0483). The 500 kV line bisects the project boundaries of the Rose, Red Cherry, and Ridge Timber Sales and all projects are located within the current MSO critical habitat boundary. We concurred with a “no effect” determination on the MSO for both the Rose Timber Sale (July 20, 1993) and Red Cherry Timber Sale (June 30, 1993). The Ridge Timber Sale initially commenced in 1993 but the process was completed after February 2005. On February 28, 2005, we responded to the Forest’s request to concur with a “may affect not likely to adversely affect” finding pertaining to the MSO and its critical habitat within the Ridge Timber Sale boundary. There are 88 acres of MSO (restricted) critical habitat included in the Ridge Timber Sale. Gentry PAC, which also occurs within the action area, has had no treatments in the PAC. No adverse effects to MSO and its critical habitat occurred as a result of the Rose, Red Cherry, and Ridge Timber sales.

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

MSO surveys using standardized protocols began in Arizona in the late 1980s. Results from these surveys led to the establishment of management territories that were later modified into PACs in compliance with the MSO Recovery Plan (USDI 1995).

There are two MSO PACs within the action area (Appendix B, Figures 2 and 3). The northernmost portion of the transmission line ROW does not travel through any MSO PACs, but at its closest, is approximately 0.25 mile from the Colcord PAC. Farther south, the transmission line ROW crosses the approximate 0.75 mile wide Gentry Canyon, located within the eastern end of the Gentry MSO PAC. Below is the recent known history of MSO within both PACs. Surveys did not occur after the 2002 monitoring season. Owls are expected to occupy these PACs and use areas outside of the PAC boundaries for foraging and roosting. While the development of MSO nesting and foraging habitat may be slower than other species, it can be altered quickly as a result of fire, fire management, beetle-killed trees, or wind throw.

Results of monitoring the Colcord and Gentry Mexican Spotted Owl Protected Activity Centers, Pleasant Valley Ranger District, AZ, 1990-2002

PAC Name	PAC #	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Colcord	120501	O-?Y	O-2Y	O-1Y	O-1Y	O-2Y	O-NF	O-NN	IM-NR	O-NU	M	NI	M	M
Gentry	120523	NI	NI	NI	NI	NI	O-NU	IM-NR	NI	NI	IM-NR	NI	IM-NR	

O = Pair occupancy inferred or confirmed,, M= Male inferred or confirmed, F= Female inferred or confirmed, P= Presence of a single owl inferred or confirmed – sex unknown Y= # of young fledged, NI= No information
 NU= Nesting status undetermined, NY= Nesting status undetermined – no young produced,
 NN= Non-nesting /non-reproduction confirmed, NA= Nest abandoned, NF= Nest failed, A= Absence or unoccupied,
 IM-NR= Informally monitored – no response or location

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

Catastrophic wildfire remains the largest factor impacting MSO and MSO critical habitat, yet other smaller factors also exist and can also exacerbate the risk of fire. Several years of drought has increased the susceptibility of ponderosa pine and pinon-juniper trees to insect infestation. The combination of tree mortality from drought and/or insects is prevalent within the action area and habitat surveys within the ROW have not been completed recently; therefore, the extent of tree mortality is unknown. Tree mortality is expected to continue within the action area as long as drought conditions persist.

Recreational use throughout Pleasant Valley Ranger District has increased as human populations continue to rise within urban areas and people spread to rural Arizona. As a result, hiking, ATV's, off-road vehicles, dispersed camping, hunting, horseback riding, etc. can increase the risk of disturbance to nesting MSOs. People engaged in these activities also provide increased ignition sources. The Pleasant Valley Ranger District has, in some seasons, restricted access during the spring and summer months to reduce fire risks.

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.

At the northernmost end of the 500-3 vegetation clearance project ROW, a contiguous 12 miles (727 acres) exists within designated MSO critical habitat. A total of 8.75 miles and 595.5 acres meets the definition of protected steep-slope and restricted MSO habitat. This northernmost portion of the ROW is within 0.25 mile of the Colcord PAC. A little further south the ROW crosses an additional 0.75 mile and 45.5 acres within the Gentry PAC.

Direct effects

We do not anticipate any direct effects to MSO as a result of the proposed project. Vegetation clearing and associated activities will not occur within the Colcord PAC. Activities within 0.25 mile of the Colcord PAC will occur prior to March 1, 2007, to prevent direct impacts to nesting owls. Therefore, we do not anticipate that tree-cutting activities will result in any direct impacts to adult MSOs. The transmission line does cross Gentry PAC, high above Gentry Canyon. MSO habitat in the canyon is not in any danger of impacting the transmission line; however, a few pinyon-pines and juniper 50-feet away from the edge of the canyon will be removed within the Gentry PAC (Scott Paulsen, APS, pers. comm.). Pinyon-pine and juniper trees are not expected to provide nesting or roosting habitat for the owls (USDI 2004). Activities within Gentry PAC will occur outside of the MSO breeding season in order to prevent direct impacts to nesting owls and removal of pinyon-pine and juniper trees in Gentry PAC are not expected to

impact the availability of nesting or roosting habitat for the owl. Therefore, because of timing restrictions and low habitat quality affected by tree-cutting activities, we do not anticipate any direct effects to adult MSOs within Gentry PAC. Also, because no clearing activities will occur within PACs during the breeding season, we do not anticipate any direct effects to eggs or nestlings.

Indirect effects

Vegetation clearing and associated activities will occur greater than 0.25 mile from the Colcord and Gentry PACs during the breeding season, so we anticipate that this distance will reduce and minimize effects in these areas to a point where adverse indirect effects will be insignificant. Some research (Delaney 1997, Swarthout and Steidl 2001) did not detect owls flushing or changing their behavior due to human activities (noise disturbance and hikers) as far away as a ¼ mile. The activities analyzed in this research are expected to be similar to those occurring in the proposed action. While owls are expected to use areas outside of the Colcord and Gentry PAC, it is anticipated that owls will be most dependent on resources within PACs for nesting and foraging. Therefore, due to there being no vegetation clearing within the PACs (except for a few pinyon-pines and juniper trees in Gentry PAC) and that any work during the breeding season will be greater than a 0.25 mile from a PAC, we anticipate any indirect effects to owls within these two PACs from vegetation clearing and associated activities to be insignificant and discountable.

The altered forest conditions within the ROW and long-term impact to owls in the Colcord and Gentry PACs from vegetation clearing leads us to conclude that adverse indirect effects to owls may happen, but we do not believe they are reasonably certain to occur. MSO activity is not restricted to use of PACs. Owl home ranges and territories can extend beyond PACs and for this project specifically, into the ROW area that will be cleared. Long-term adverse indirect effects to owls from vegetation clearing could cause reduced productivity or reduced survivorship by changing prey diversity/abundance or reduced access to prey (fewer trees to hunt from). Also, creating more edge habitat as a result of clearing could cause increased competition and/or reduced survivorship by creating conditions more favorable to great-horned owls (a competitor and predator of MSO). However, forest conditions within the ROW as described in the Environmental Baseline are far from pristine, and MSOs still persist. Trees within the ROW were cleared in the 1970s and have periodically been treated over the last decade. As a result, prey diversity and abundance is likely altered and competitors likely already exist. We also reiterate that no vegetation clearing activities are expected to occur within PACs (except for habitat in Gentry PAC that is not expected to provide nesting or roosting habitat for the owls), which are believed to be the most important resources for owls. Therefore, we are not reasonably certain that the further degradation of the environmental baseline within the ROW from this proposed action will result in reduced productivity or survivorship to MSO within the Colcord and Gentry PACs.

Beneficial effects

As described within this opinion, catastrophic wildfire is the greatest threat to MSO. Therefore, actions that can reduce that risk can provide some benefit. In this project, this clearing action can create conditions that will reduce the risk of fire from electricity in the transmission lines and by creating a cleared corridor, and reduce the carrying of fire through the forest by reducing fuels.

Long-term adverse effect to the species

Overall, we conclude that the loss of 595.5 acres of protected steep slope (including PAC acres) and restricted coniferous forest habitat will result in an adverse effect to the MSO as a whole (without resulting in incidental take). A 500-foot wide corridor is a significant gap/loss for the owl and owl habitat. The corridor is wider and will contain far less forested habitat than a well-planned thinning project designed to reduce fire risk. The loss of these acres, while not configured as a typical MSO territory would likely occur, are similar to the amount of acres (600) used to designate a PAC. The removal of the coniferous tree component of these acres will prevent the continued development of owl habitat and subsequently stunt the growth of the owl population by eliminating the type of forest (protected and restricted habitat) where new nesting areas, roosts, and foraging areas are most likely to become established.

MSO critical habitat

The northernmost portion of the 500-3 transmission line ROW is a contiguous 12-mile long, 500-foot wide (727 acres) corridor of designated MSO critical habitat and occurs within the critical habitat section of Upper Gila Mountains RU-10. The upper 8.75 miles of this 12-mile section fits the criteria of restricted, steep-slope MSO habitat. An additional, but separate 45 acres of critical habitat, is located a little further south within the Gentry PAC, where the ROW crosses Gentry Canyon. As discussed previously in the Project Description section of this document only 595.5 acres of the 727 acres located within the critical habitat boundary of the project fit the critical habitat requirements. Therefore, the remaining 131.5 acres within the boundary are not considered critical habitat.

APS and SRP proposed to clear all tall-growing vegetation within the ROW and shrubs under the points of lowest sag under the power lines and within 40-feet of the power pole structures. Clearance activities will occur in 595.5 acres of critical habitat. A few pinyon-pine and juniper trees in Gentry PAC will be removed. Pinyon-pine and juniper located within a designated PAC boundary is considered critical habitat (USDI 2004). Additional habitat within the Gentry PAC will not be cleared because the transmission line crosses Gentry Canyon high enough where vegetation is not an issue. Vegetation of particular importance to MSO that will be removed outside of Gentry PAC (and within the 595.5 acres of critical habitat) includes ponderosa pine and Gambel oak. No herbaceous plants, grasses, or forbs are anticipated to be cleared, however vehicles, commercial mowers, foot travel, and tree disposal will likely temporarily affect this component of the landscape.

Primary constituent elements related to forest structure

Primary constituent elements related to forest structure include: 1) a range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 to 45 percent of which are large trees with a dbh of 12 inches or more; 2) a shade canopy created by the tree branches covering 40 percent or more of the ground; and 3) large, dead trees (snags) with a dbh of at least 12 inches.

An inventory of the exact numbers of trees by species to be removed was not provided for this project in the biological assessment. However, it was concluded in the assessment that, because

vegetation will be cleared throughout the 595.5 acres of MSO critical habitat, pine and oak trees greater than 9 inches dbh exist and will be removed. It was also determined that pine trees greater than 24 inches dbh and large snags exist and will also all be removed. As result, any shade canopy existing within critical habitat will not persist following clearing. Therefore, we conclude that the forest structure PCEs will be adversely affected by effectively removing the pine-oak component within the ROW.

Primary constituent elements related to maintaining adequate prey species

Primary constituent elements related to the maintenance of adequate prey species include: 1) high volumes of fallen trees and other woody debris; 2) a wide range of tree and plant species, including hardwoods; and 3) adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

As a result of vegetation clearing, components related to maintaining adequate prey species will be altered. Most certainly, the variety and abundance of trees will be reduced within critical habitat and the entire ROW by removing all tall-growing vegetation. However, woody debris/logs will increase as a result of vegetation clearing. Large logs will be placed at the edge of the ROW, while smaller woody debris will be left within the ROW. The ultimate goal of this project is to allow only shrubs and other small plants to persist in this ROW. The initial vegetation clearing and creation of woody debris may create a short-term increase in prey availability to owls, but we are less certain in the long-term whether this conversion will cause a shift in prey species detectable by owls. Ganey and Balda (1994) found owls foraging more than expected in un-logged forest in Arizona than selectively logged forest. Ward (2001) also found that woodrats occurred more frequently in un-logged forested area. It is our conclusions that reducing the variety, distribution, and abundance of trees within critical habitat by eliminating tall vegetation outweighs any possible benefit to prey species from creating woody material within or at the edge of the corridor. Prey species are only of use by predators, like MSO, if the predator has access to them. MSO are not a species that will fly out over large open areas to capture prey. They are more likely to capture prey by flying short distances down to the ground in a denser forested environment. As a result, clearing perching and foraging trees and maintaining a 500-foot wide corridor creates a cleared/open environment that MSOs would not be expected to use for foraging.

In summary, we conclude that the clearing of tall-growing vegetation within the 500-3 ROW will adversely affect 595.5 acres of designated critical habitat (including PAC, protected steep-slope, and restricted habitat). The PCEs with respect to forest structure will be essentially removed due to the goal of eliminating the pine-oak habitat within the ROW and converting the forest to a low-growing plant community. There may be a short-term benefit to increasing prey availability for MSO as result of vegetation clearing and creating woody debris/material within and at the edge of the ROW but the elimination of perching and foraging trees within the ROW and creation of a 500 foot-wide corridor effectively eliminates a majority of the ROW for foraging. Therefore, the function and conservation role of MSO critical habitat within the 500-3 ROW will be removed.

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. We anticipate that recreational actions like hiking, horseback riding, hunting, ATV riding, etc. will persist within the cleared corridor. Vegetation clearing could create a more attractive environment to some activities that involve ATVs. These activities have the potential to exacerbate the effects of action by causing disturbance to owls that may be using the perimeter of the ROW. However, the majority of these actions are most likely to occur during the day, and would be considered insignificant.

CONCLUSION

This biological opinion does not rely on the regulatory definition of “destruction or adverse modification” critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

After reviewing the current status of MSO and its designated critical habitat, the environmental baseline for the action area, the effects of the 500-3 vegetation clearing project, and cumulative effects, it is the FWS's biological opinion that the 500-3 vegetation clearing, is not likely to jeopardize the continued existence of the MSO, and is not likely to destroy or adversely modify designated MSO critical habitat. While this action will effectively permanently remove the PCEs from this corridor, no destruction or adverse modification of that critical habitat is anticipated.

We present these conclusions for MSO and its critical habitat for the following reasons:

- Vegetation clearing in Gentry PAC will only remove a few pinyon-pine and juniper trees 50 feet away from Gentry Canyon. Vegetation clearing will not occur in the Colcord PAC.
- Vegetation clearing will occur in an already degraded forest environment.
- Vegetation clearing will provide some benefit by reducing risk of fire and possibly creating a fire break that could prevent catastrophic fire from spreading throughout the forest.
- Vegetation clearing will avoid direct- and disturbance-related indirect effects to owls by occurring over 0.25 mile from PACs during the nesting season.
- The critical habitat removed by vegetation clearing represents about 1% (595.5 acres of the 562,988 acres) of critical habitat in the Upper Gila Mountains RU-10.

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

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

It is the conclusion of this biological opinion that while the permanent loss of 727 acres of designated critical habitat (of which 595.5 acres meet the definition of restricted, steep-slope habitat) is an adverse affect to the MSO, the timing of the project and the location of the project outside of MSO PACs will not result in the incidental take of MSOs within Colcord and Gentry PACs.

AMOUNT OR EXTENT OF TAKE

The FWS does not anticipate the proposed action will incidentally take any MSOs for the following reasons:

- Vegetation clearing will occur between January and March 1, 2007, within critical habitat and 0.25 of a mile away from the nearest PAC (Colcord PAC) prior to the nesting season. As a result, no direct incidental take to nesting owls is anticipated.
- Vegetation clearing will occur about 0.25 of a mile from the Colcord PAC and clearing is restricted to pinyon-pine and juniper on the ridge top of Gentry Canyon within Gentry PAC. No additional vegetation clearing will occur in Gentry PAC. As a result, no disturbance or habitat alteration is anticipated to alter nesting activities such as pair bonding, nest selection, foraging, and as a result, no subsequent productivity will be adversely affected.
- No vegetation clearing will occur within Colcord PAC.

EFFECT OF THE TAKE

The proposed action will not result in incidental take of MSO.

REASONABLE AND PRUDENT MEASURES and TERMS AND CONDITIONS

There is no incidental take anticipated for this project.

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 APS, SRP, and the FS continue to participate in the implementation of the recovery plan for this species.
2. We recommend that APS and SRP maintain records of habitat types, slopes, tree species, location, abundance and size removed, and a detailed photographic record of this action in order to more accurately document what occurred and be able to more quickly assess future actions occurring along this ROW.
3. We recommend that APS, SRP, and TNF initiate standardized surveys for MSO within all PACs and in areas not in PACs that meet restricted and steep-slope habitat conditions to determine the current distribution and abundance of owls on the Forest.

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

REINITIATION NOTICE

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

The FWS appreciates the Forest Service, APS, and SRP efforts to identify and minimize effects to listed species from this project. For further information please contact Greg Beatty (x247) or Debra Bills (x239).

Please refer to consultation number 22410-06-F-0441 in future correspondence concerning this project.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Scott Paulsen, Arizona Public Service, Prescott, AZ
Shaula Hedwall, US Fish and Wildlife Service, Flagstaff, AZ
Bob Broscheid, Habitat Branch Chief, Arizona Game and Fish Department, Phoenix, AZ
Mike Sredl, Nongame Branch, Arizona Game and Fish Department, Phoenix, AZ

W:\Ryan Gordon\Tonto NF\Other\500kv\500 kV clearance Pleasant Valley RD BO.doc:egg

LITERATURE CITED

- Arizona Game and Fish Department. 2006. Chiricahua leopard frog releases into Gentry Creek Management Area on August 21 and September 7, 2006. Memo from Suzanne Goforth to Files, September 18, 2006. Arizona Game and Fish Department, Phoenix, Arizona.
- Arizona Public Service. 2006. Guidelines for Vegetation Management in Utility Corridors in Arizona. November 28, 2006. Arizona Public Service, Phoenix, Arizona.
- Delaney, D.K. 1997. Effects of helicopter and chain saw noise on nesting Mexican spotted owls. MS Thesis. Northern Arizona University, Flagstaff, Arizona. 100 pp.
- Fletcher, K. 1990. Habitat used, abundance, and distribution of the Mexican spotted owl, *Strix occidentalis lucida*, on National Forest System Lands. U.S. Forest Service, Southwestern Region, Albuquerque, New Mexico. 78 pp.
- Ganey, J.L. and R.P Balda. 1994. Habitat Selection by Mexican Spotted Owls in Northern Arizona. *The Auk* 111(1):162-169.
- Ganey, J.L., G.C. White, A.B. Franklin, J.P. Ward, Jr., and D.C. Bowden. 2000. A pilot study on monitoring populations of Mexican spotted owls in Arizona and New Mexico: second interim report. 41 pp.
- Swarthout, E. and R. Steidl. 2001. Flush responses of Mexican spotted owls to recreationists. *Journal of Wildlife Management* 65(2):312-317.
- U.S. Department of the Interior (USDI), Fish and Wildlife Service. 1991. Mexican spotted owl status review. Endangered species report 20. Albuquerque, New Mexico.
- U.S. Department of the Interior (USDI), Fish and Wildlife Service. 1993. Endangered and Threatened Wildlife and Plants; final rule to list the Mexican spotted owl as threatened. *Federal Register* 58(49):14248-14271. March 16, 1993.
- U.S. Department of the Interior (USDI), Fish and Wildlife Service. 1995. Recovery Plan for the Mexican Spotted Owl. Albuquerque, New Mexico.
- U.S. Department of the Interior (USDI), Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; final designation of critical habitat for the Mexican spotted owl; final rule. *Federal Register* 69(168):53182-53298. August 31, 2004.
- U.S. Department of the Interior (USDI), Fish and Wildlife Service. June 10, 2005. Biological opinion on the Forest Service's continued implementation of the land, resource, and management plans for the 11 southwestern region national forests and grasslands, R2/ES-TE, 02-21-03-F-0366. U.S. Fish and Wildlife Service, Region 2, Albuquerque, New Mexico.

Ward, J.P. 2001. Ecological Responses by Mexican Spotted Owls to Environmental Variation in the Sacramento Mountains, New Mexico. P.h.D. dissertation, Colorado State University, Fort Collins, Colorado.

Wilson, E.D. 1969. A resume of the geology of Arizona. University of Arizona Press, Tucson. 140 pp.

Appendix A: CONCURRENCES

Chiricahua leopard frog

Listed status: Threatened without critical habitat

BACKGROUND

Chiricahua leopard frogs are present and were recently introduced into the Gentry Management Area on the Pleasant Valley Ranger District of the Tonto National Forest in August and September of 2006 (Arizona Game and Fish Department 2006). Releases helped augment three extant populations (Bottle Spring, Carroll Spring, and Crouch Creek) and create two new populations (Ramer Tank, Pine Spring). Ramer Tank is approximately 1.1 miles from the 500-3 line, while Bottle Spring, Carroll Spring, and Crouch Creek are approximately 2 miles from the 500-3 line. Pine Spring is about 5 miles from the 500-3 line. A total of 1162 metamorphs and tadpoles were placed in these locations. The greatest number of frogs were placed in Ramer Tank (n=662).

There are no perennial or intermittent streams that connect Bottle Spring, Carroll Spring, and Crouch Creek to the transmission line. However, there is a continuous drainage that travels downstream from Ramer Tank and crosses under the transmission line.

While no vegetation clearing or other associated work will occur within, adjacent, or over locations where frogs were placed, frogs (especially juvenile frogs) can disperse over ground and through drainages, primarily between March and October.

As a conservation measure, APS and SRP will perform all vegetation clearing activities within a two mile radius of Ramer Tank (including three drainages) between January and March 1, 2007, in order to prevent any impacts to dispersing frogs.

DETERMINATION OF EFFECTS

We concur with your “may affect, not likely to adversely affect” determination for the Chiricahua leopard frog for the following reasons:

- No clearing activities or associated actions (driving, disposal of vegetation, etc.) will occur at ponds, springs, or streams where frogs primarily persist. All vegetation clearing activities are greater than a mile away from such sites.
- All clearing activities within two miles of frog habitat will be conducted between January and March 1, 2007. As a result, frogs are not expected to be dispersing into vegetation clearing areas or roads (due to the colder temperatures) while clearing activities are occurring.
- There are no drainages that occur underneath the transmission lines which flow into known occupied frog ponds, springs, or streams. As a result, we do not anticipate that any run-off and/or sediment created from clearing and commercial mowing to impact the frog or frog habitat.

Should project plans change, or if information on the distribution or abundance of frogs indicates that listed or proposed species may be affected in a manner or to an extent not previously considered, this determination may need to be reconsidered and reinitiation of consultation may be warranted [50 CFR 402.14(b)].

Appendix B - FIGURES

Figure 1 - Overview of the 500-3 Project Area (the red line indicates the 34-mile long 500-3 ROW)

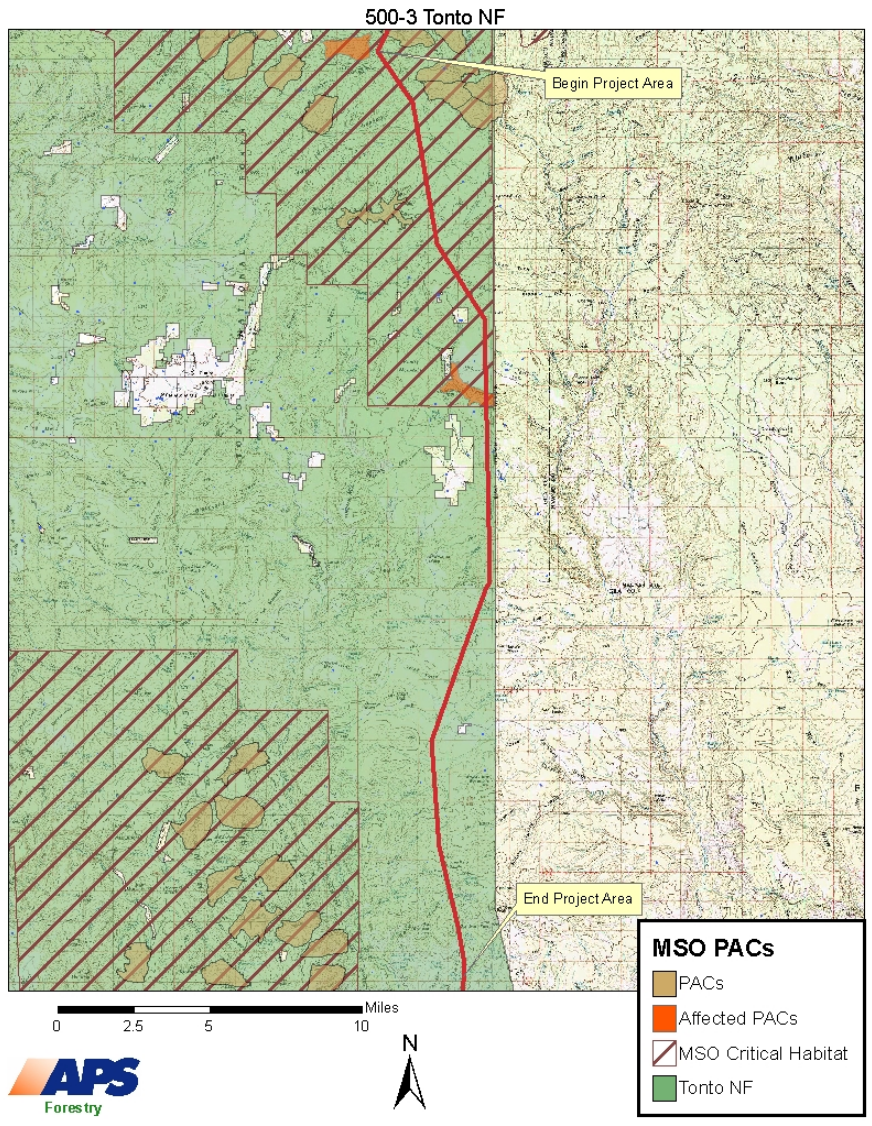


Figure 2 - Colcord Mexican Spotted Owl PAC and location of 500-3 ROW

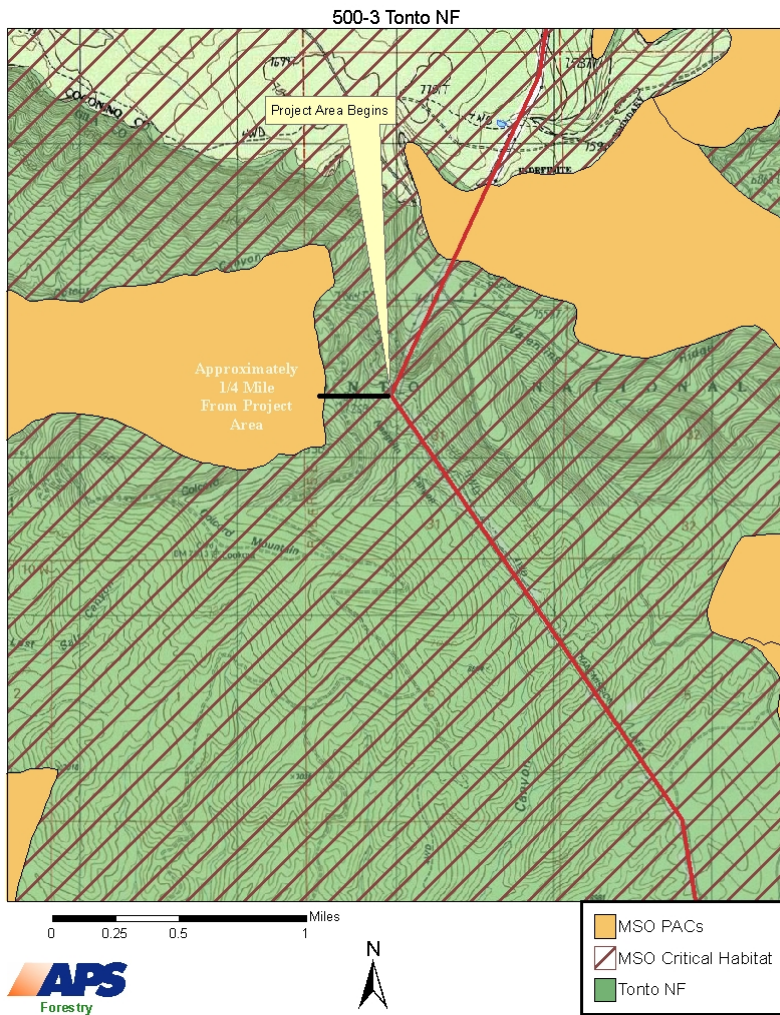


Figure 3 - Gentry Mexican Spotted Owl PAC and location of 500-3 ROW

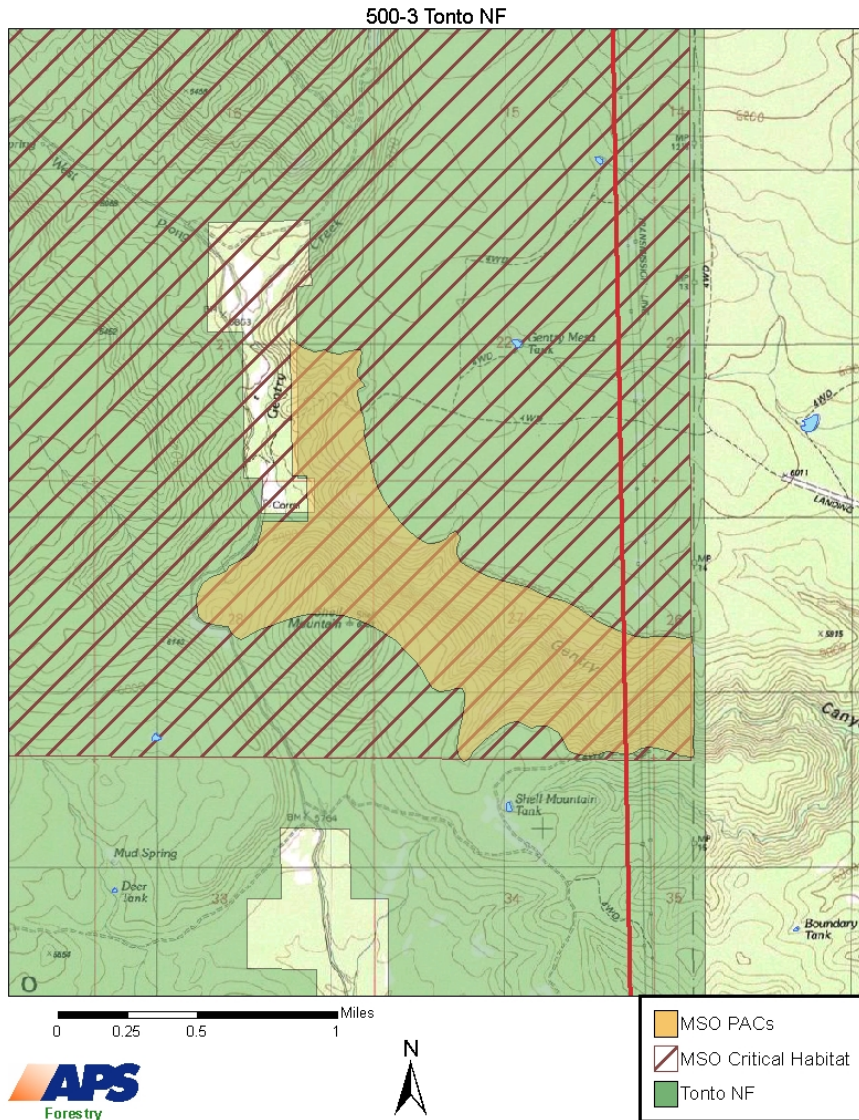


Figure 4 - Mow Areas in the 500-3 Project Area

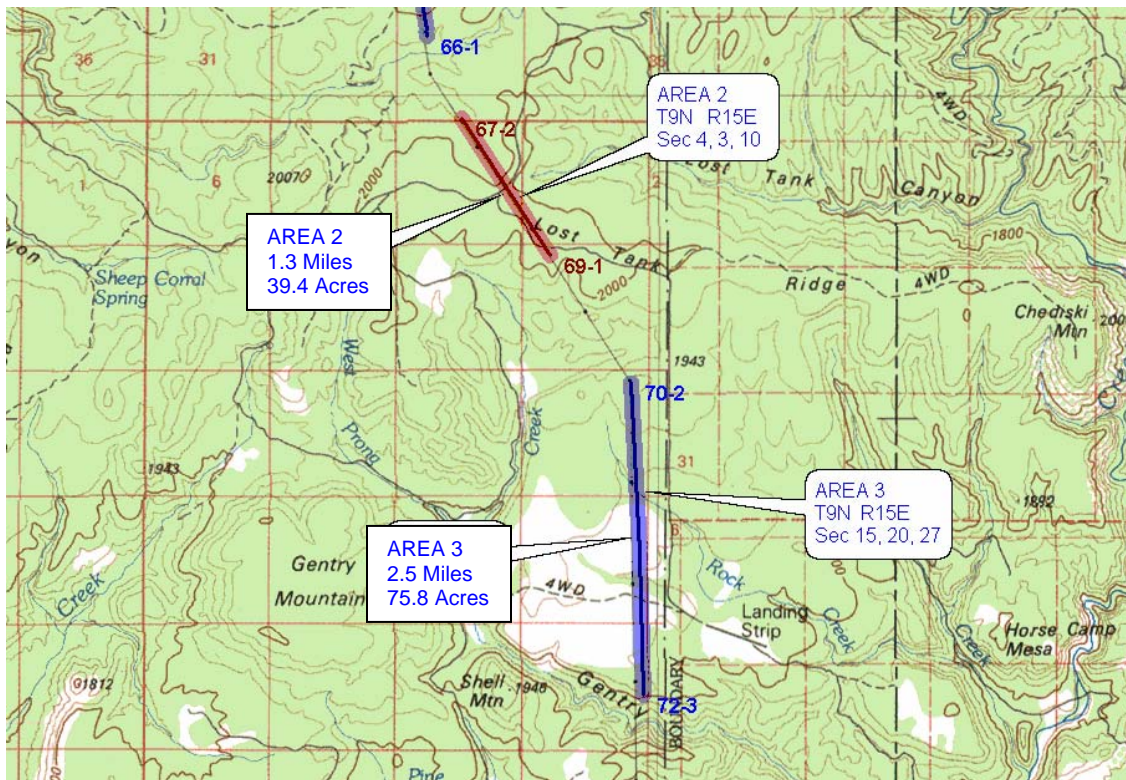
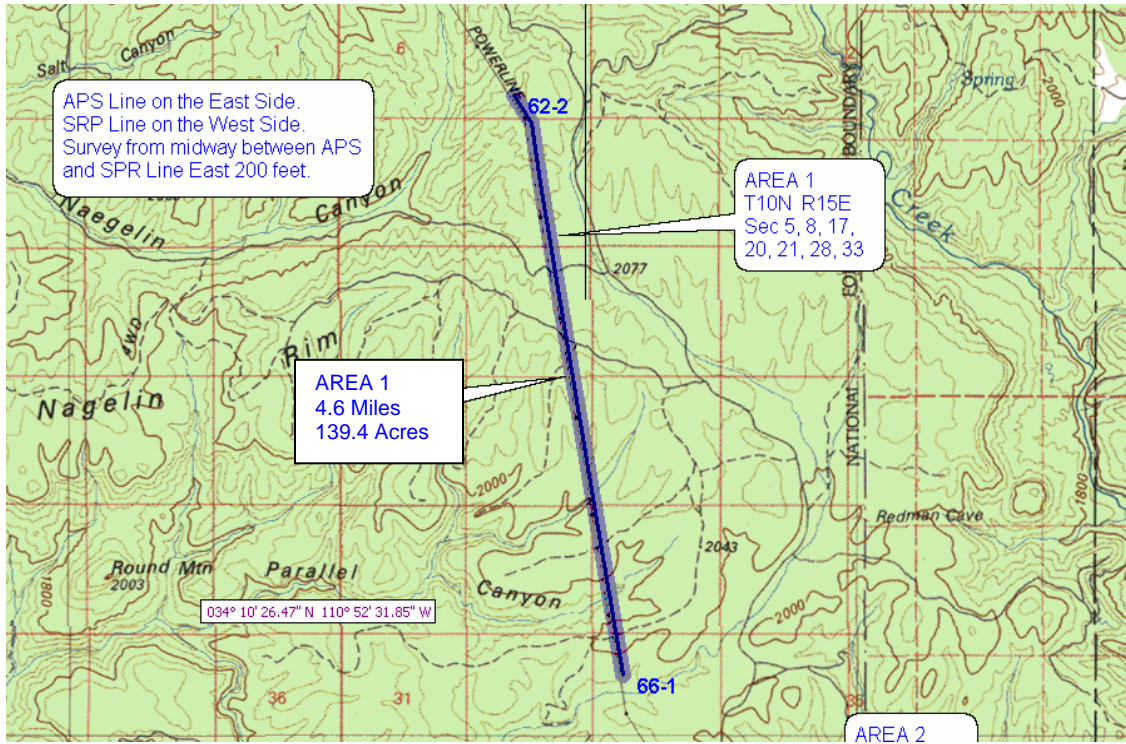


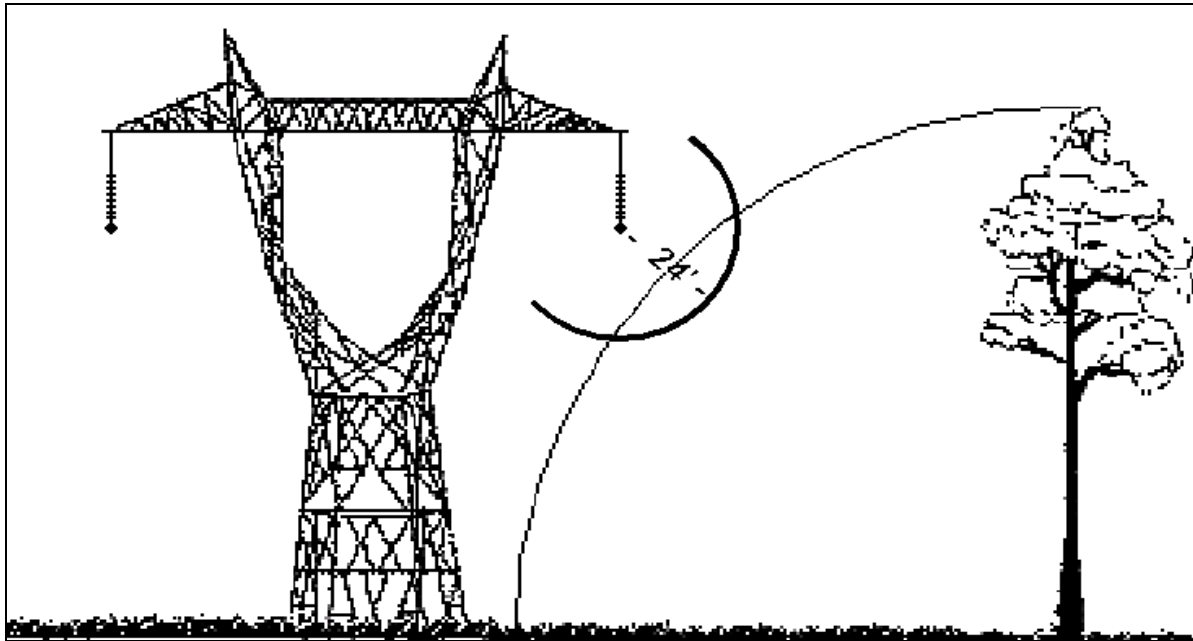
Figure 5 - Example of a Typical Truck and Chipper



Figure 6 - Example of a Typical Commercial Mower

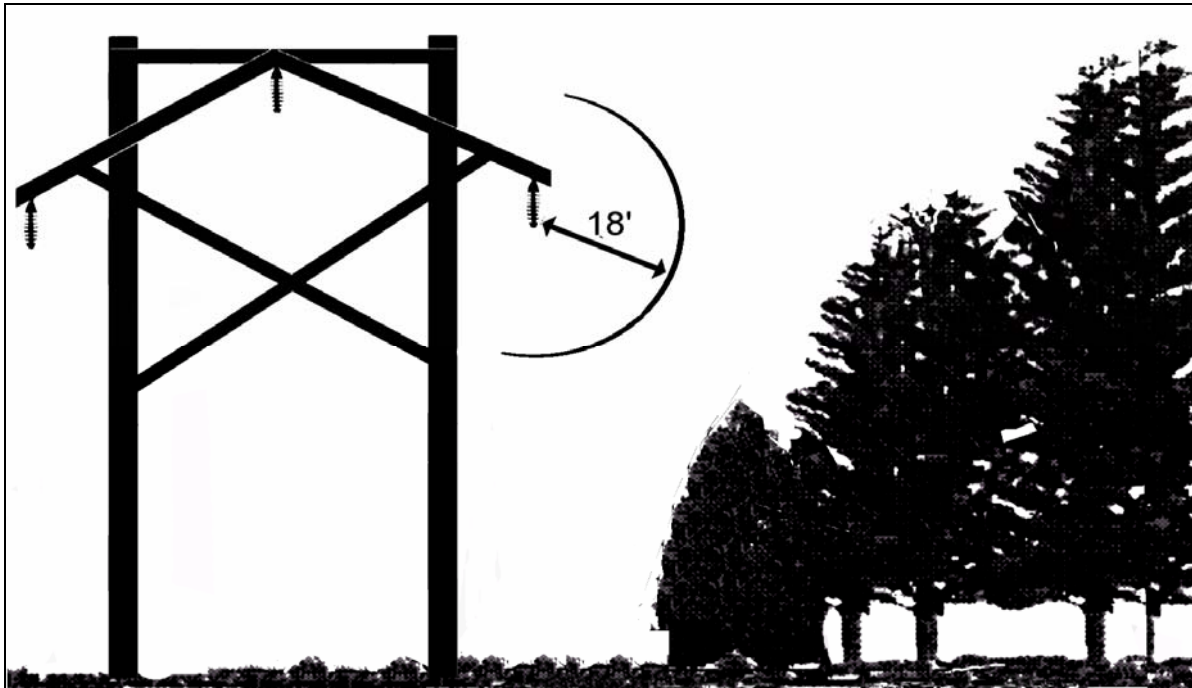


Figure 7



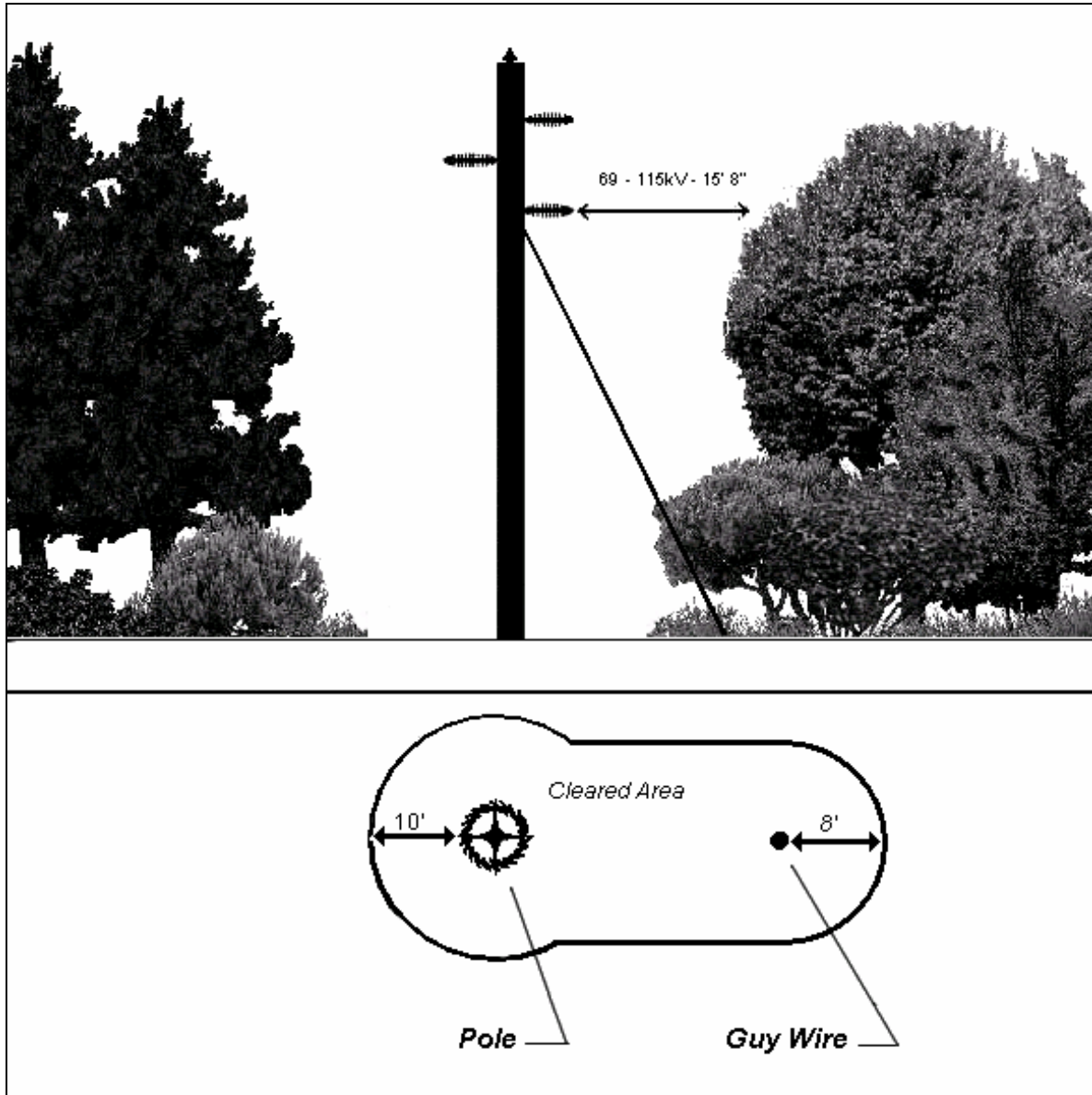
A high-voltage electric arc will occur if a falling tree passes within 24-feet of a transmission line. This 'conductor security zone' must be maintained to prevent flashover and ignition of fires.

Figure 8



The power lines on 230kV and 115kV transmission corridors are mounted on wooden structures. The width of the corridor is typically maintained narrower than the 345kV and 500 kV steel-tower corridors.

Figure 9



To prevent burning of poles and melting of support guys, the surrounding area must be cleared of vegetation.