United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

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Cons: # 02ENNM00-2014-F-0266

Maria T. Garcia, Forest Supervisor
Santa Fe National Forest
11 Forest Lane
Santa Fe, New Mexico 87508

Dear Ms. Garcia:

Thank you for your request for formal consultation and conferencing with the U.S. Fish and Wildlife Service (USFWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1531 et seq.), as amended (Act). We began early coordination with you and received a Biological Assessment (BA) (dated June 6, 2014) and supplemental information, which evaluate the impacts of the Southwest Jemez Mountains Restoration Project Santa Fe National Forest Jemez Ranger District Sandoval County, New Mexico (Restoration Project). At issue are potential impacts from the proposed action on the Mexican spotted owl (*Strix occidentalis lucida*) (MSO) and its critical habitat, the Jemez Mountains salamander (*Plethodon neomexicanus*) (salamander) and its critical habitat, the New Mexico meadow jumping mouse (*Zapus hudsonius luteus*) and its proposed critical habitat, and the Rio Grande Cutthroat trout (*Oncorhynchus clarki virginalis*) (cutthroat trout). You determined that the proposed action "may affect, is likely to adversely affect" the MSO and its designated critical habitat, the salamander and its designated critical habitat, the jumping mouse and its proposed critical habitat.

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in Gifford Pinchot Task Force v. USDI Fish and Wildlife Service (CIV No. 03-35279) to complete the following analysis with respect to critical habitat. This consultation analyzes the effects of the action and its relationship to the function and conservation role of MSO, salamander, and jumping mouse critical habitat to determine whether the action destroys or adversely modifies critical habitat.

The current document constitutes the USFWS's Biological Opinion based on our review of the proposed action and its effects on the MSO and its designated critical habitat, the salamander and its designated critical habitat, and the jumping mouse and its proposed critical habitat in accordance with section 7 of the Act.

Concurrence

You also determined that the proposed action "may affect, is not likely to adversely affect" the Canada lynx (*Lynx canadensis*) and Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*), and "is not likely to jeopardize" the North American wolverine (*Gulo gulo luscus*) and the Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*). You requested concurrence with these determinations. Based on information provided in your BA, which is hereby incorporated by reference, we find that your proposed action will have insignificant and discountable effects to the Canada lynx and Western Yellow-billed Cuckoo and concur with your "may affect, is not likely to adversely affect" determinations.

On August 13, 2014, the USFWS withdrew the proposed rule to list the North American wolverine the proposed rule to list the southern Rocky Mountains as a nonessential experimental population under section 10(j) of the Act. Similarly, On October 1, 2014, we determined that the Rio Grande Cutthroat trout does not warrant listing as a threatened or endangered species and we removed it from our list of candidate species (79 FR 59140). Although we recognize and appreciate your commitment to request our review of your proposed project that may affect these species and their habitats, this project does not need to undergo conferencing for the North American wolverine or the Rio Grande cutthroat trout because section 7 of the Act no longer applies.

CONSULTATION HISTORY

This BO is based on the information provided in your BA dated June 6, 2014, Supplemental Information dated January 16, 2015, February 18, 2015, April 1, 2015, June 10, 2015, other information available to the USFWS, email conversations with your staff, data in our files; data presented in the MSO Recovery Plan (2012); literature review; and other sources of information including the final rule to list the MSO as threatened and designate critical habitat (58 FR 14248; 69 FR 53182), the salamander as endangered and designate critical habitat (78 FR 55600, 78 FR 69569), the jumping mouse as endangered and propose critical habitat (Service 2014; 79 FR 33119, 78 FR 37328). References cited in this BO are not a complete bibliography of all literature available on the MSO, salamander, or jumping mouse. A complete administrative record of this consultation is on file at this office.

Collectively, the Forest and the USFWS agreed to meet annually to coordinate and share information regarding implemented actions and planned actions for the subsequent year. This process will assist in reducing impacts to the MSO, salamander, jumping mouse, their habitat, and the primary constituent elements (PCEs) of critical habitat and to maximize the conservation of the species. While we generally anticipate that the Restoration Project will result in long-term conservation benefits for listed species, there still remains uncertainty on the short- and long-term effects of some of the treatments and associated actions. The annual meetings will result in a description of planned work for the upcoming year, incorporation of any new information or data, review of analysis of effects for upcoming year, review of environmental baseline and summary of take that has occurred under this proposed action, and the potential to annually

adjust the incidental take statement based on information gathered. By meeting annually, strategically planning actions both spatially and temporally, reviewing and incorporating monitoring data, and developing site specific best management practices (BMPs), we will be able to assess and ensure that the proposed action will not jeopardize the species nor adversely modify designated critical habitat. Moreover, actions will continue to be developed that can further the conservation and recovery of the species.

Table 1. Summary of the consultation history for the proposed action.

Date	*Event*
October 2008, March 2009, March 2011, May 2013	Forest informally consulted with USFWS through field trips, meetings and workshops designed to collaboratively develop restoration objectives, treatment actions, and mitigation measures for project treatments in the Southwest Jemez Mountains Restoration project area.
May 7, 2013	A consultation agreement between the USFWS and the Forest was signed.
June 10, 2013	Due date from consultation agreement for the Forest to submit a Biological Assessment to the USFWS was not met.
March 19, 2014	The USFWS received a copy of the Draft Environmental Impact Statement, a Biological Assessment, and request to initiate formal consultation.
June 6, 2014	The USFWS received a revised Draft Biological Assessment, dated June 6, 2014.
August 14, 2014	The USFWS indicated the BO would be delayed due to other priorities.
November 6, 2014	The USFWS submitted a request to the Forest for clarifications and additional information needed.
December 16, 2014	Representatives from the Forest and the USFWS met to discuss additional clarifications to the action.
January 29, 2015	The USFWS received supplemental information to the BA, dated January 16, 2015.
February 2015	Additional email communications occurred between the USFWS and the Forest.
February 18, 2015	The USFWS received additional supplemental information that was requested during the December 16, 2014 meeting.
March 24, 2015	The USFWS submitted another request to the Forest for clarifications and additional information needed.

April 1, 2015	The USFWS received additional supplemental information in response to the March 24, 2015 request.
May 8, 2015	USFWS Provides a Draft Biological Opinion for review by the Forest.
June 3, 2015	The USFWS and the Forest met to discuss additional information needs to include additional portions of the proposed action into the analysis.
June 10, 2015	The USFWS received additional supplemental information in response to the March 24, 2015 request.
June 19, 2015	USFWS Provides a Draft Biological Opinion for review by the Forest.
June 24, 2015	The USFWS received comments on Draft Biological Opinion.
June 30, 2015	The USFWS and Forest met.
July 7, 2015	The USFWS received comments on Draft Biological Opinion.
July 9, 2015	The USFWS and Forest met.

BIOLOGICAL OPINION

Action Area

The action area for the proposed project includes all areas directly or indirectly affected by the Federal action. For this consultation, the action area covers about 110,000 acres of National Forest System land and is located in the Middle Jemez River Watershed. The Village of Jemez Springs lies in the middle of the area; Jemez Pueblo and the Town of Ponderosa are 7 miles and 4 miles, respectively, to the south (Appendix, Figure 1). There are also several small subdivisions and communities in the mountains around Jemez Springs, including Sierra de los Pinos and Thompson Ridge.

The Jemez River flows through the middle of the area; the East Fork of the Jemez River is a designated Wild and Scenic River. Other drainages include San Antonio Creek, Rio Guadalupe, and Rio Cebolla. South-to-southwest facing canyons and mesas dominate the area and include Virgin Canyon and Virgin, Holiday, Schoolhouse, and Stable Mesas to the west of the Jemez River, and Paliza and San Juan Canyons and Cat and San Juan Mesas to the east. Elevations range from 10,109 feet at the top of Cerro Pelado to 5,500 feet in the canyon bottoms.

DESCRIPTION OF THE PROPOSED ACTION

Most of the information regarding the project in this Biological Opinion is from the Revised Draft Threatened and Endangered Species Assessment (dated June 6, 2014), the Draft Environmental Impact Statement (dated February 2014), Supplemental Documents (dated January 16, 2015; February 18, 2015; April 1, 2015, June 10, 2015), and email communications.

The full project description from these documents is incorporated by reference and summarized below.

The proposed action consists of conducting treatments that will restore the structure and function of forests and watersheds across approximately 110,000 acres of the Jemez Ranger District over the next 10 years. This project was designed to meet the intent of the Collaborative Forest Landscape Restoration Program by treating a range of landscape features such as various forest types, meadows, riparian and aquatic areas. Design criteria were developed based on the restoration action needed and the potential response of an area to treatment as well as site specific conditions and landscape features. Due to the relatively large project area and the inability to have site specific information for all areas that may need restoration, the Santa Fe National Forest (Forest) approached the problem by describing the restoration action needed and the range of potential treatments that might be used to address that need. Therefore, the project does not specifically describe the timing or activities at a given location except where specific restrictions will be followed to avoid or minimize affects to listed species.

Your stated purposes for the Restoration Project are to:

• Restore the structure, function, and resilience of ponderosa pine and dry mixed conifer forests, which would also reduce the potential for uncharacteristically severe and intense wildfires while promoting low-intensity, frequent surface fires that were common across this landscape.

• Improve the function of riparian ecosystems and streams, and improve fish and wildlife habitat, vegetative diversity, and water quality.

• Provide for the sustainability of archaeological sites, traditional cultural properties, sacred sites, and forest resources and areas associated with traditional practices.

• Offset treatment costs and provide economic opportunity through wood product removal.

The BA evaluates the predicted effects of landscape treatments and associated activities that may result in adverse effects to federally listed species. Effects for each species were determined by evaluating the expected outcome of implementing project design features, mitigations, and BMPs for the project. The actions described in and analyzed in the Final BA and supplements are hereby incorporated by reference, but summarized below.

Treatments that include mechanical harvesting for the proposed action may include a variety of methods that will depend on the site specific characteristics of the forest, size of trees to be removed, and how the goals of the project are best met. Overall, treatments that affect listed species or their habitat will be coordinated between the Forest and the USFWS. Additional conservation measures for each treatment type that will be implemented for listed species or their

habitat are described in the Conservation Measures section according to species.

Uneven-aged Mechanical Treatment with Openings and Burning in Ponderosa Pine

Treatments will occur only on slopes less than 40 percent and total approximately 23,600 acres (See Figure 9, pg. 25, DEIS). Material (logs) generated during treatment will be removed (harvested) throughout the area. Uneven-aged desired conditions will be achieved through mechanical treatments. The treatments include mechanical cut and remove trees using chain saws, feller-bunchers, and skidders. These treatments are designed to follow the goshawk guidelines. Prescribed burning will occur in these areas to reduce fuel loading and restore ecological processes. Burning will be repeated every 5 to 10 years for maintenance. The Forest anticipates thinning about 4,000 acres each year of all forest types including those listed below.

Stand Improvement Thinning and Burning in Ponderosa Pine

Treatments will occur on slopes less than 40 percent and total approximately 1,500 acres across the project area. The thinning is designed to improve tree growth, tree vigor and create stand structure that will allow future uneven-aged desired conditions. This will occur in young, even-aged stands such as plantations, stands with dwarf mistletoe, along some prescribed burn fire lines, and in remote and/or steep stands. Material (logs) generated during treatment will be removed (harvested) throughout the area. Prescribed burning will occur in these areas to reduce fuel loading and restore ecological processes. Burning may be repeated every 5 to 10 years for maintenance.

Uneven-aged Mechanical Treatments with Openings and Burning in Dry Mixed Conifer

Treatments will occur on slopes less than 40 percent and total approximately 5,800 acres across the project area (See Figure 9, pg. 25, DEIS). Uneven-aged desired conditions will be achieved through mechanical treatments consistent with the management recommendations within the 2012 MSO Recovery Plan, First Revision. Material (logs) generated during treatment will be removed (harvested) throughout the area. Prescribed burning will occur in these areas to reduce fuel loading and restore ecological processes. Burning will occur every 7 to 12 years.

Stand Improvement Thinning and Burning in Dry and Wet Mixed Conifer

Treatments will occur on slopes less than 40 percent and total approximately 80 acres. As in the ponderosa pine, the thinning is designed to improve tree growth, tree vigor and create stand structure that will allow future uneven-aged desired conditions. We proposed to use this type of thinning in young, even-aged stands, stands with light to moderate dwarf mistletoe, along some prescribed burn fire lines, and along some prescribed fire control lines. The thinning is similar to the treatment for ponderosa pine, but with a higher stand density, to move these stands toward desired conditions consistent with the 2012 MSO Recovery Plan. Material (logs) generated during treatment will be removed (harvested). Prescribed burning will occur in these areas to reduce fuel loading and restore ecological processes. Burning may occur every 7 to 12 years.

Landscape Prescribed Burning

Landscape prescribed burning will occur on approximately 76,900 acres for fuels reduction and landscape restoration as listed above. Approximately 32,400 acres of the 76,900 will take place on slopes greater than 40 percent. Some line preparation (thinning and limbing) will occur next to control lines, heritage sites, and other areas to reduce fire intensity.

All treatment areas are planned to be prescribed burned over the next ten years. It is anticipated that slash from mechanical treatment will be "jackpotted", where the majority of slash is loosely piled, but some branches are scattered for promote incomplete fuel consumption, leaving some wood on the site. Burns can be planned when fuels are still slightly wet, to allow retention of greater amount of wood to be left for wildlife resources. Prescribed burning typically occurs in the fall, when fuels have dried from the summer rains; however, spring burning could be conducted if the prescription parameters are met. There will be no ignition within the wet mixed conifer; however, stands and clumps of wet mixed conifer will not be lined to exclude fire.

Thinning prescriptions and prescribed fire parameters used in the modeling are outlined in the ***SW Jemez Project FSVeg SDA Methodology Products Report***. Potential fire types (crown fire activity) for all alternatives are summarized in Table 2.

Table 2. Relative improvement in type of wildfire modeled within the project area when compared with the No-Action Alternative (Alternative 2).

	Fire Type	Alt. 1	Alt. 2. - No Action
Acres	Surface	83,652	56,321
	Passive Crown	16,950	37,761
	Active Crown	5,226	19,060
	Relative Improvement	30,901	--
% of Area	Surface	79.0%	49.8%
	Passive Crown	16.0%	33.4%
	Active Crown	5.0%	16.8%
	Relative Improvement	29.1%	--

Your BA notes the improvements in fire behavior for those cover types with proposed treatments, specifically dry mixed conifer and ponderosa pine (Table 3). Without management action, much of the Southwest Jemez Mountain analysis area will remain at risk for crown fire as stands continue to depart from their historic range of variability. Modeling of crown fire potential for Alternative 2 shows nearly half of the landscape experiencing crown fire. Limiting prescribed fire to reduce ladder fuels and neglecting high stocking levels could potentially lead to high severity effects to vegetation. However, the Proposed Action shows a relative improvement in potential crown fire

activity when compared with the No-Action (Alternative 2). Relative improvement is the improvement in fire type, whether moving the landscape from active crown fire to passive crown fire or passive crown fire to surface fire when compared to current condition. Over much of the project area, fire behavior during extreme weather will be moderated following project implementation. The post project stand structure modeled effectively reduced the risk of crown fire initiation and spread by promoting surface fire across 70–77% of the landscape. It is especially important to note the significant improvements in fire behavior for those cover types with proposed treatments, specifically dry mixed conifer and ponderosa pine.

Treatments in Wet Mixed Conifer

About 1,150 acres of mechanical thinning and harvest will occur within wet mixed conifer on slopes less than 40 percent. Prescribed burning will occur on a limited basis to achieve landscape objectives for fuels reduction. Areas prioritized for treatment include: proximity to endangered species habitat, wildland-urban interface areas, springs, insects, disease, or other special need areas, or small inclusions of wet mixed conifer within other forest types.

Treatments to Maintain or Increase Aspen Cover Type

This will occur on approximately 1,800 acres. Mechanical treatments include tree cutting and log removal (harvested) on slopes less than 40 percent. Prescribed burning may occur on a limited basis to meet other objectives. The treatments will either maintain existing aspen stands or create new stands of aspen. Treatments to maintain aspen will be done in stands where aspen is dominant. Treatments to create new aspen patches (5 to 40 acres) will be created in stands where aspen is no longer dominant. This treatment will focus on stimulating new aspen stands on the north and west portions of the project area because the eastern portion is adjacent to the Las Conchas wildfire where aspen in now regenerating.

Table 3. Potential wildfire behavior, expressed as fire type, by forest cover type.

Cover Type	Fire Type	Alternative 1	Alternative 2
Aspen 751 ac.	Surface	69%	27%
	Passive Crown	29%	53%
	Active Crown	3%	20%
Burned-Up (Las Conchas) 638 ac.	Surface	66%	23%
	Passive Crown	22%	42%
	Active Crown	12%	35%
Dry Mixed	Surface	79%	28%

	Passive Crown	16%	42%
	Active Crown	5%	30%
Wet Mixed Conifer 3,892 ac.	Surface	73%	23%
	Passive Crown	15%	33%
	Active Crown	12%	45%
Oak Woodland 377 ac.	Surface	88%	15%
	Passive Crown	8%	57%
	Active Crown	4%	28%
Pinyon/ Juniper 34,451 ac.	Surface	66%	62%
	Passive Crown	26%	28%
	Active Crown	8%	10%
Ponderosa Pine 43,527 ac.	Surface	91%	52%
	Passive Crown	8%	34%
	Active Crown	2%	14%
Total 105,536 ac.	Surface	79%	50%
	Passive Crown	16%	33%
	Active Crown	5%	17%

Treatments in Piñon-Juniper

About 1,000 acres of piñon-juniper will be thinned to reduce erosion, protect heritage sites, or to increase habitat for songbirds. Material (fuelwood) generated during treatment may be removed throughout the area. There will be no broadcast burning; slash will either be scattered to provide ground cover or piled and burned.

Treatments in Mexican Spotted Owl Protected Activity Centers

Prescribed fire will occur on approximately 3,112 acres. Mechanical thinning will occur on slopes less than 40 percent and on 414 acres to improve MSO habitat and move stands toward having larger trees and a multi-storied canopy. Forested stands will be thinned of trees up to 18-inches diameter at breast height (dbh) and material removed from the site. Nest areas will not receive mechanical treatments and, to the extent possible, avoided during prescribed burning. Additionally, no activities will take place in occupied PACs during the breeding season. This will be confirmed through surveys using the approved USFWS protocol.

Treatments for Old Growth

The forest plan calls for allocating 20 percent of each cover type within an ecosystem management unit to be managed as old growth, preferably in patches greater than 40 acres. For our analysis the entire project area is considered an ecosystem management unit. Since, landscape treatments are generally limited to ponderosa pine and mixed conifer within the

project area, twenty percent each of ponderosa pine and mixed conifer will be managed for old growth. Stands will be thinned if it will hasten their trajectory toward old growth characteristics as defined in the forest plan (pp. 68–69A). Thinning will aim to increase tree growth and size, reduce fire risk, create uneven-aged stands, and create downed wood, though some material (logs) generated during treatment may be removed to reduce fuel loading. Stands within or adjacent to MSO protected activity centers, northern goshawk post-fledging family areas, Jemez Mountains salamander locations and designated critical habitat for the salamander, and visually-sensitive areas for old growth management will be prioritized for treatment. Trees over 24-inches dbh will not be cut.

Treatments for Maintaining or Increasing Meadow Habitat

It is proposed that approximately 5,500 acres would be treated for maintaining or increasing meadow habitat: 2,500 acres in the uplands and 3,000 acres in riparian areas. This includes all meadow types: upland, lowland, and wet meadows. Activities will be to cut and potentially harvest trees around the meadow margin that are encroaching on meadows as a result of altering the historic fire cycle.

Treatments to Enhance Seeps and Springs

This will occur on approximately 175 acres. Conifers within 100 feet of seeps or springs may be removed to improve water flow.

Treatments to Reduce Erosion Effects from Headcuts

Number and locations for the entire project have not yet been determined. This treatment is to fill headcuts with soil, rock, or boulders, or re-contour areas. Activities to reduce erosion from headcuts are to typically dig across the headcut, tie material into the sides and bottom of the headcut, and place harden material (rock) into the cut to stabilize the soils. Usually this technique incorporates wire baskets or gabions to hold rock in place. These are anticipated to be less than a 0.10 acre each and in the case of hill slope riling, likely only 3-4 yards square (about 144 ft^2). Disturbed areas may be seeded with native grasses.

Treatments to Enhance Native Riparian Vegetation and Restore Areas Damaged by Dispersed Recreation

There are 144 inventoried dispersed campsites identified for restoration in the project area. These sites are mostly along the Rio Cebolla, Rio Guadalupe, and East Fork Jemez River, although some sites may be treated along San Antonio Creek and the Jemez River as well. Sites will be closed by placing soil, rock, and boulders on and around the site and by planting native vegetation. Exclosures or logs may be used to protect newly planted vegetation.

Treatments to Restore Instream Habitat

Heavy machinery will be used to create pools and channels, replace culverts, and place or remove log and rock stream structures to improve habitat for fisheries and watershed conditions. Treatments will take place along the Rio Cebolla, Rio Guadalupe, San Antonio Creek, East Fork Jemez River, and Jemez River.

Nonnative Invasive Plants

Pull weeds, use prescribed grazing, burn, and use methods other than herbicides to control populations of these plants. Use of herbicides may be authorized upon completion of the environmental impact statement for the Invasive Plant Control Project (Noxious Weeds EIS) for the Santa Fe and Carson National Forests.

Screen Water Sources from Human Disturbance

Plant trees and shrubs around tanks and drinkers to screen them from view of roads. Fence newly planted vegetation.

Increase Water Sources for Wildlife

Construct earthen dams or trick tanks to increase water availability for wildlife. This will occur in the upper portions of watersheds and drainage headwaters throughout the project area.

Create Snags

Snags may be created by girdling or other means. Work will be done throughout project area in stands lacking large diameter (greater than 16 inches) snags or that do not meet forest plan standards

Cultural Site Protection

There are approximately 3,000 sites in the project area. Trees and brush will be removed from sites. Sites on the National Historic Register and those eligible for the register will have priority for treatment.

Road Maintenance

Build rolling dips, improve drainage structures, and replace gravel. This will be done on selected roads that will be used for hauling wood products or heavy machinery. Roads will receive maintenance as needed throughout the life of the project or duration of the contract.

Opening existing closed roads or new temporary roads

Approximately 20 miles of existing closed roads are proposed to be re-opened or re-constructed to provide access and product removal. These roads would receive maintenance as needed throughout the life of the project or duration of the contract and will be closed after use. In addition to these roads approximately 12 miles of temporary roads will be constructed. These temporary roads will also receive maintenance as needed throughout the life of the project or duration of the contract. All temporary roads will be decommissioned after use See Appendix A, DEIS page 286-288 for decommissioning BMPs).

Road Decommissioning Treatments

These treatments will restore unneeded roads to a more natural state. Methods include: installing signs, blocking entrances, restoring vegetation, eliminating the road bed, and other methods described in Forest Service Manual (FSM) 7734.1. Approximately 100miles of road in the project area have been cleared for decommissioning. Roads causing damage to hydrological resources, cultural resources or threatened, endangered, and sensitive species habitat are a priority for decommissioning.

Gravel Pits

Up to five new gravel pits will be developed or existing pits will be expanded to provide gravel for road maintenance and improvement work. The maximum size of a single pit will not exceed 5 acres. Rock pits will be located near existing system roads to minimize the need for road reconstruction. No pits will be built in the Inventoried Roadless Area, Jemez Wild and Scenic River Corridor, or within the Jemez National Recreation Area. Temporary roads will be built as needed to access the pits.

Forest Plan Amendments

Ten forest plan amendments are proposed. Seven of these pertain to federally protected species and are listed in the BA dated June, 2014. These are site-specific amendments and apply to this project only.

A Description of Mechanical Treatments

The Forest Service provided additional information in the document titled "Supplemental Information for Southwest Jemez Mountains Landscape Restoration Project BA Regarding Jemez Mountains Salamander, #2 - A Description of Mechanical Treatment", dated February 12, 2015. This document describes a system that will most likely be used on this project, but that there may be variations based on the system that is selected from those proposed by contractors.

The Forest describes the following techniques as "most likely to be used" for mechanical treatments. Mechanical harvesting in the Jemez Mountains typically uses a boomed feller-buncher to cut and bunch timber and a rubber-tired skidder to remove cut trees from the stump and skid (drag) them to a roadside landing area for processing and loading. Feller-bunchers

often have a boom reach of approximately 25 feet from the center point of the machine rotation. This enables the machine to cut multiple trees while the machine remains stationary and reaches out to individual trees with its boom and attached cutting head. Cut timber is then placed into bunches to facilitate efficient skidding. Feller-bunchers typically have 2 tracks with a combined width of approximately 56 inches. The machine makes a pass through the cutting unit approximately every 35 feet; this can vary as a result of topography and other factors. Ground pressure exerted by a John Deere 759 tracked feller-buncher is approximate 8 pounds per square inch (PSI).

Using these estimates approximately 13% of the stand would be have a one-time pass of a feller-buncher over it with a ground pressure of approximately 8 PSI. After the trees are cut and bunched, a rubber-tired grapple skidder backs up to, or drives alongside the bunched trees. The grapple closes around the logs and lifts them so that the butt end of the tree is free of the ground and only the tops drag behind the machine. Ground PSI for rubber tired skidders can vary, but for a John Deere 648 it is approximately 13 PSI. Skidders cover a greater percentage of the area than a feller-buncher, and will make multiple passes over some of the trails. A rough estimate of trails coverage is 15% of the area receiving more than one pass, and another 10% of the area that receives only a single pass with a skidder. These percentages may vary between operations.

The processor is at the landing. It removes branches, cuts the logs to desired length, and piles them in a deck, or loads them directly onto a truck. A TimberPro 725 processor has a PSI of 6.4. The skidder then takes slash (tops and branches) back to woods on its return trip, laying the slash on the skid trail. Then the skidder drives on top of a layer of slash, which distributes weight, protects the soil, incorporates organic material into the soil, and reduces soil compaction. Additional slash can be piled and burned, or scattered in the woods, depending on ecological and fire objectives.

The logging truck is usually self-loading; it takes logs from the deck and loads them onto the truck, which drives on existing system roads out of the woods.

Summary

- Feller-buncher - 13% of the area with a one-time pass of 8 PSI
- Skidder- 10% of the area with a one-time pass of 13 PSI
- Skidder- 15% of the area with up to three of 13 PSI
- Skidder- additional passes to return slash, PSI reduced because slash is laid ahead of machinery.
- Processor- moves along road with 6.4 PSI
- Logging Trucks- stay on existing road beds

Interrelated and Interdependent Activities Associated with the Proposed Action

Disposal or Handling of Biomass (cut trees) from Treatment Areas.

In the Forest Service response to information dated March 27, 2015, it is stated that the mechanisms for which biomass will be handled from treatments is not known, because the Forest will ask bidders for the contract to determine how they will dispose of the biomass, but a likely scenario is described. The likely scenario is that trees larger than 12 inches dbh would be hauled away on log trucks. Trees 5-12 inches dbh might be a) piled next to a road, for firewood for the public, or b) hauled away, or c) chipped on site into a truck and hauled away. Trees smaller than 5 inches dbh and tops and limbs of larger trees would be jackpot piled (loose piles with some scattered slash in between). The area would then be burned in a manner to consume the needles, twigs, and most of the piles, but leave some wood scattered around the site. Mastication may be used in few places, like next to houses, where burning is not feasible or adjacent to fire lines to reduce ladder fuels.

The Forest will create new containment lines, perimeter lines, fire lines, or burn area boundaries, from here on referred to as "fire line" for prescribed fire, which will be constructed by hand tools or machine. Fire line is typically a 2-3 foot-wide clearing of fuel/organic material down to bare mineral soil. This equates to about 0.37 acre per mile of fire line. The majority of fire line for the proposed action will be constructed by hand and every opportunity to use natural or man-made barriers (roads, etc.) will be utilized to minimize fire line construction.

Foaming agents may be used to protect archeological sites with wooden elements or artifacts.

Approximately 152 new landings may be created in designated critical habitat for the salamander. These landing are small in size (0.25 acre on average). Landing sites will be placed where old landing sites were once located when possible to minimize new areas of disturbance.

Implementation Timeline

Road maintenance will occur any time the roads are not wet or snow covered, prior to restoration activities. The prescribed burning will occur after the thinning slash is dry and road maintenance work is complete. While the burning is expected to occur during the fall months based on typical climatic conditions, it could also possibly occur in the spring if meteorological conditions are favorable. Prescribed burning in the spring will not take place in areas where there will be anticipated affects to MSO during the breeding season or when salamanders will be near the surface.

Conservation Measures

Conservation Measures to Avoid or Minimize Effects to MSO (see Appendix A in the DEIS for the full list of Design Features, Best Management Practices (BMPs) and Mitigations).

Adhere to the forest plan, as amended, applicable to proposed activities in MSO habitat (USFS 1987, Appendix D, pp. 1-6) unless noted in the proposed forest plan amendent (Table 7).

- All PACs within the project area will be monitored for occupancy and reproduction.

- Implementation activities will occur in no more than half of the PACs per year. In addition, the Forest Service will attempt to minimize the amount of time that they are operating in PACs to reduce disturbance to owls. For example, if trees are cut in January/February, then burning will occur in the fall. If cutting occurs in September, then burning would occur the fall of the following year.
- Activities within PACs will be avoided during the breeding season unless adequately surveyed to determine occupancy for the season.
- Plan ignitions away from the nest area but allow prescribed burning through the nest area.

Silviculture Treatment Design Criteria

- No thinning/mechanical treatments in nest areas.
- Thin if owl habitat can be improved or to reduce fire risk. This will move the stands toward having larger trees and a multi-storied canopy.
- Thin primarily small trees (less than 18" dbh) and create gaps in the overstory using group or individual tree selection.
- Leave trees larger than 24-inches diameter.
- Burn slash from treatments.

Table 4. Acres of MSO PACs proposed for treatment.

	Alt1
Harvest	414
Rx	3,112
Roads (mi)	5
Landings (#)	13

Table 5. Acres of proposed treatment by PAC (see map)

PAC Name	Acres
Hummingbird	47.6
Lake Fork	40.6
Paliza	<1.0
San Juan	81.7
Virgin	154.5
West Mesa	89.5
Total	413.9

Conservation Measures to Avoid or Minimize Effects to Jemez Mountains salamander

The following is a list of conservation measures that will reduce adverse effects to salamanders, designated critical habitat, occupied habitat, or potential salamander habitat from project activities:

- Use of heavy machinery, and other activities within critical habitat, with the exception of burning, that could directly affect salamanders that are active above ground (surface active) will only be conducted when ground is frozen or dry, and outside of the salamander restriction period, June15 through October 30. If seasonal rains begin earlier than June 15, any activity that could directly affect salamanders will not occur in designated critical habitat. Exemptions to implementing activities within critical habitat (except burning) during the salamander restriction period (June 15 through October 30), or when salamanders may be surface active that could directly affect salamanders that are surface active will only be done with coordination and agreement between the Forest Service and USFWS.
- In potential habitat follow soil and watershed BMP's on page 298-299 of EIS will be protective of salamander habitat.
- Exception to burning during the salamander restriction period will be conducted when most or all salamanders would not be surface active because salamanders are only surface active when environmental conditions are wet enough to keep their skin moist, which generally is too wet to carry fire.

- General habitat elements will be monitored before and after treatment implementation through fire effects monitoring plots. The Forest Service is currently collecting this information using the fire ecology crew at Bandelier National Monument.
- The Forest Service is working with Rocky Mountain Research Station, Fire Sciences Laboratory on a project designed to evaluate prescribed fire burn intensities near archeological sites and its influence on large logs. The Forest Service will look for opportunities to use these data where feasible to reduce impacts to salamander habitat features from prescribed burning activities.
- The Forest Service will target some salamander survey efforts in aspen stands to assess salamander occupancy in this forest type.
- Slash in aspen treatment areas will be managed to generate only enough slash to burn at low to moderate fire intensities to achieve desired results in aspen stands. Approximately 5-7 tons per acre will be left onsite. Excess wood will be removed to prevent a hot fire from damaging the soil.
- With the exception of aspen treatments, creation of openings in mixed conifer in designated critical habitat for the salamander will be one acre or smaller.
- Roads causing damage to hydrological resources, cultural resources or threatened, endangered, and sensitive species habitat are a priority for decommissioning.
- Disturbance around road decommissioning sites will attempt to stay in the compacted footprint of the road except where re-establishment of contours or re-connecting natural

drainages are required to address water quality or watershed issues. New ground disturbance along the edges will be minimized.

- The Forest Service will work with the USFWS during annual meetings to identify the locations of road decommissioning and the level of effort that will be needed to protect salamanders.
- Avoid building or making jackpot piles of slash on top of existing large logs.
- Burn jackpot piles as soon as possible, preferably within one year of creation, to miniminize salamander colonization and use of piles as habitat in critical habitat.
- Burn piles before broadcast burning to reduce fire intensity and heat pentration into the soil within critical habitat.
- As much as practicable, ignite prescribed fire in a manner to minimize torching within occupied salamander habitat.
- The Forest will limit new landings in salamander critical habitat to 0.25 acres.
- The Forest will attempt to make no more than three passes on a skid trail, as research shows compaction greatly increases after a third pass.
- Fire lines for prescribed burning will not be constructed in critical habitat during the salamander restrictive season of June 15 through October 30.
- The Forest will rehabilitate all equipment staging area, log landings, skid trails, temporary roads, and firelines at the end of the project. Rehabilitiation may include returning the ground to natural contours, implementing decompaction and erosion control meaasures as needed, pulling slash and rocks across fire lines, disguising entrances, and covering bare soil with slash, chips, needles, or cut brush as necessary, and reseeding with native seeds as needed. Any rehabilitation that disturbes the soil, rocks, woody debris, or potential cover objects in designated critical habitat for the salamander will occur when conditions are dry or frozen, or outside of the surface activity season for the salamander.
- On areas to be prescribed burned, fire prescriptions will be designed to minimize soil temperatures over the entire area. High intensity fire should occur on 10% or less of the entire area. Fire prescriptions will be designed so that soil and fuel moisture are such that fire intensity is minimized and soil health and productivity are maintained. Fire effects monitoring plots will be used to assess percentage of high intensity fire that occurred over prescribed burn areas.
-

- The Forest will leave 5-15 tons per acre of downed logs greater than 12-inches diameter in dry mixed conifer and 3 snags per acre, on average. Douglas fir trees will be favored for placement in designated critical habitat for the salamander.
- Areas for old growth management will be prioritized stands within or adjacent to MSO protected activity centers; goshawk post-fledging family area; Jemez Mountains salamander locations, salamander designated critical habitat; and visually-sensitive areas.
- The Forest Service will work with the USFWS to identify how to best implement silviculture treatments in wet mixed conifer.
- Disturbance of soil, rocks, boulders, and large woody debris in designated critical habitat will be avoided to the greatest extent practical.
- Any activity that uses heavy machinery will only occur in designated critical habitat for the salamander when soils are dry or frozen unless there is an exemption. Working when soils are dry or frozen will reduce the risk of crushing salamanders, as they are unlikely to be impacted when soil is dry of frozen, and will minimize compaction of soil.
- Heavy machinery may be used at times when the soil is not dry or frozen, but will be kept strictly to existing compacted road surfaces (and will not enter the shoulder of the road) in designated critical habitat for the salamander unless otherwise agreed upon and documented between the Forest and USFWS.

Conservation Measures to Avoid or Minimize Effects to the New Mexico Meadow Jumping Mouse (see Appendix A of the DEIS for the full list of Design Features, Best Management Practices (BMPs) and Mitigations).

- A re-channeled reach will require fencing around both the new and old channel and native riparian planting (for bank stabilization).
- Riparian restoration on San Antonio Creek and Rio Cebolla, will be prioritized to improve habitat at known jumping mouse locations.
- Bank stabilization will be selected for those perennial streams needing actions to improve a 303-d listing or needed for aquatic habitat improvement.
- Project activities with heavy equipment will take place outside of the jumping mouse active season. Use of locally available material will be considered.

Riparian streamcourse buffers:

- Severe erosion hazard: 120 feet on each side of streamcourse.
- Moderate erosion hazard: 100 feet on each side of streamcourse.
- Slight erosion hazard: 70 feet on each side of streamcourse.

Fire and Fuels

- In areas to be prescribed burned, establish filter strips (also known as Aquatic Management Zones). These stream reaches will be designated as a protected streamcourse.

  The following are recommendations to protect streamcourses:

- Fuels will not be ignited within this buffer area, though fire would be allowed and is expected to creep into the buffer.
- Avoid, minimize, or mitigate adverse effects of prescribed fire and associated activities on soil, water quality, and riparian resources that may result from excessive soil disturbance as well as inputs of ash, sediment, nutrients, and debris into waterways.

Headcut Treatments

- Use hand treatments at those locations without road access or those areas needing less (mechanical) disturbance due to resource concerns (soils, cultural, wildlife).

Riparian Area Restoration

- Best effort will be made to use immediate, locally available material and plants.
- Where vegetation has been severely impacted, planting of riparian shrubs (i.e., willow) and transplanting of sedges may be done within the exclosures.

Road Decommissioning

- Roads causing damage to hydrological resources, cultural resources or threatened, endangered, and sensitive species habitat are a priority for decommissioning.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Jeopardy Determination

In accordance with policy and regulation, the jeopardy analysis in this BO relies on four components in our evaluation for each species: (1) the Status of the Species, which evaluates the

species' range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and, (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the species' current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The jeopardy analysis in this BO places an emphasis on consideration of the range-wide survival and recovery needs of the species and the role of the action area in the survival and recovery of the species as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Adverse Modification Determination

In accordance with policy and regulation, the adverse modification analysis in this BO relies on four components: 1) the Status of Critical Habitat, which evaluates the range-wide condition of designated critical habitat for the species in terms of primary constituent elements (PCEs), the factors responsible for that condition, and the intended recovery function of the critical habitat overall; 2) the Environmental Baseline, which evaluates the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; 3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the PCEs and how they will influence the recovery role of affected critical habitat units (CHUs); and, 4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the PCEs and how they will influence the recovery role of affected CHUs.

For purposes of the adverse modification determination, the effects of the proposed Federal action on each species' critical habitat are evaluated in the context of the range-wide condition of the critical habitat, taking into account any cumulative effects, to determine if the critical habitat range-wide would remain functional (or would retain the current ability for the PCEs to be functionally established in areas of currently unsuitable but capable habitat) to serve its intended recovery role for the species.

STATUS OF SPECIES/CRITICAL HABITAT

Mexican Spotted Owl

In 1993, the USFWS listed the Mexican spotted owl (hereafter, referred to as Mexican spotted owl, spotted owl, and owl) as threatened under the Act. The USFWS appointed the Mexican spotted owl Recovery Team in 1993 (USFWS 1993), which produced the Recovery Plan for the Mexican spotted owl in 1995 (USFWS 1995). The USFWS released the final Mexican spotted owl Recovery Plan, First Revision (Recovery Plan) in December 2012 (USFWS 2012a). Critical habitat was designated for the spotted owl in 2004 (USFWS 2004).

A detailed account of the taxonomy, biology, and reproductive characteristics of the Mexican spotted owl is found in the Final Rule listing the owl as a threatened species (USFWS 1993), the original Recovery Plan (USFWS 1995), and in the revised Recovery Plan (USFWS 2012a). The information provided in those documents is included herein by reference.

The spotted owl occurs in forested mountains and canyonlands throughout the southwestern United States and Mexico (Gutiérrez et al. 1995). It ranges from Utah, Colorado, Arizona, New Mexico, and the western portions of Texas south into several States of Mexico. Although the owl's entire range covers a broad area of the southwestern United States and Mexico, it does not occur uniformly throughout its range. Instead, the Mexican spotted owl occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Known owl locations indicate 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.

In addition to this natural variability in habitat influencing owl distribution, human activities also vary across the owl's range. The combination of natural habitat variability, human influences on owls, international boundaries, and logistics of implementation of the Recovery Plan necessitates subdivision of the owl's range into smaller management areas. The 1995 Recovery Plan subdivided the owl's range into 11 "Recovery Units" (RUs): six in the United States and five in Mexico. In the revision of the Recovery Plan, we renamed RUs as "Ecological Management Units" (EMUs) to be in accord with current USFWS guidelines. We divided the Mexican spotted owl's range within the United States into five EMUs: Colorado Plateau (CP), Southern Rocky Mountains (SRM), Upper Gila Mountains (UGM), Basin and Range-West (BRW), and Basin and Range-East (BRE) (Appendix, Figure 2). Within Mexico, the Revised Recovery Plan delineated five EMUs: Sierra Madre Occidental Norte, Sierra Madre Occidental Sur, Sierra Madre Oriental Norte, Sierra Madre Oriental Sur, and Eje Neovolcanico.

Mexican spotted owl surveys since the 1995 Recovery Plan have increased our knowledge of owl distribution, but not necessarily of owl abundance. Population estimates, based upon owl surveys, recorded 758 owl sites from 1990 to 1993, and 1,222 owl sites from 1990 to 2004 in the United States. The Recovery Plan (USFWS 2012a) lists 1,324 known owl sites in the United

States. An owl site is an area used by a single or a pair of adult or subadult owls for nesting, roosting, or foraging. The increase in number of known owl sites is mainly a product of new owl surveys being completed within previously unsurveyed areas (e.g., several National Parks within southern Utah, Grand Canyon National Park in Arizona, Guadalupe National Park in West Texas, Guadalupe Mountains in southeastern New Mexico and West Texas, Dinosaur National Monument in Colorado, Cibola NF in New Mexico, and Gila NF in New Mexico). Thus, an increase in abundance in the species range-wide cannot be inferred from these data (USFWS 2012a). However, we do assume that an increase in the number of areas considered to be occupied is a positive indicator regarding owl abundance.

We are currently working with the Southwestern Region of the Forest Service to conduct a pilot study for the population monitoring recommended in the Revised Recovery Plan (USFWS 2012a). The effort to conduct this work occurred during the 2014 breeding season and we will be meeting with the Recovery Team, Forest Service, and the Rocky Mountain Bird Observatory (contractor) to analyze and discuss the results of the pilot effort in the fall of 2014. This information will be used to develop a strategy for conducting rangewide population monitoring using the occupancy modeling framework and begin assessing Mexican spotted owl population trends.

Two primary reasons were cited for the original listing of the Mexican spotted owl in 1993: (1) the historical alteration of its habitat as the result of timber-management practices; and, (2) the threat of these practices continuing. The danger of stand-replacing fire was also cited as a looming threat at that time. Since publication of the original Recovery Plan (USFWS 1995), we have acquired new information on the biology, threats, and habitat needs of the Mexican spotted owl. Threats to its population in the U.S. (but likely not in Mexico) have transitioned from commercial-based timber harvest to the risk of stand-replacing wildland fire (USFWS 2012a). Recent forest management has moved away from a commodity focus and now emphasizes sustainable ecological function and a return toward pre-settlement fire regimes, both of which have potential to benefit the spotted owl. However, as stated in the Revised Recovery Plan (USFWS 2012a), there is much uncertainty regarding thinning and burning treatment effects and the risks to owl habitat with or without forest treatment as well. Therefore, efforts to reduce fire risk to owls should be designed and implemented to evaluate the effects of treatments on owls and retention of or movement towards desired conditions.

Southwestern forests have experienced larger and more severe wildland fires from 1995 to the present, than prior to 1995. Climate variability combined with unhealthy forest conditions may also synergistically result in increased negative effects to habitat from fire. The intensification of natural drought cycles and the ensuing stress placed upon overstocked forested habitats could result in even larger and more severe fires in owl habitat. Several fatality factors have been identified as particularly detrimental to the Mexican spotted owl, including predation, starvation, accidents, disease, and parasites.

Historical and current anthropogenic uses of Mexican spotted owl 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 owl nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Livestock and wild ungulate grazing is prevalent throughout the range of the owl and is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts are increasing throughout the Southwest, especially in meadow and riparian areas. There is anecdotal information and research that indicates that owls in heavily used recreation areas are much more erratic in their movement patterns and behavior. Fuels reduction treatments, though critical to reducing the risk of severe wildland fire, can have short-term adverse effects to owls through habitat modification and disturbance. As the human population grows in the southwestern United States, small communities within and adjacent to wildlands are being developed. This trend may have detrimental effects to spotted owls by further fragmenting habitat and increasing disturbance during the breeding season.

Several fatality factors have been identified as particularly detrimental to the Mexican spotted owl, including predation, starvation, accidents, disease, and parasites. For example, West Nile Virus also has the potential to adversely impact the Mexican spotted owl. The virus has been documented in Arizona, New Mexico, and Colorado, and preliminary information suggests that owls may be highly vulnerable to this disease (Courtney et al. 2004). Unfortunately, due to the secretive nature of spotted owls and the lack of intensive monitoring of banded birds, we will most likely not know when owls contract the disease or the extent of its impact to the owl range-wide.

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, high-severity, stand-replacing wildland fire is probably the greatest threat to the Mexican spotted owl within the action area. As throughout the West, fire severity and size have been increasing within this geographic area. Landscape level wildland fires, such as the Rodeo-Chediski Fire (2002), the Wallow Fire (2011), and the Whitewater-Baldy Complex (2012) have resulted in the loss of tens of thousands of acres of occupied and potential nest/roost habitat across significant portions of the Mexican spotted owl's range.

Finally, global climate variability may also be a threat to the owl. Changing climate conditions may interact with fire, management actions, and other factors discussed above, to increase impacts to owl habitat. Studies have shown that since 1950, the snowmelt season in some watersheds of the western U.S. has advanced by about 10 days (Dettinger and Cayan 1995, Dettinger and Diaz 2000, Stewart et al. 2004). Such changes in the timing and amount of snowmelt are thought to be signals of climate-related change in high elevations (Smith et al. 2000, Reiners et al. 2003). The impact of climate change is the intensification of natural drought cycles and the ensuing stress placed upon high-elevation montane habitats (IPCC 2014, Cook et al. 2004, Breshears et al. 2005, Mueller et al. 2005). The increased stress put on these habitats is

likely to result in long-term changes to vegetation, and to invertebrate and vertebrate populations within coniferous forests and canyon habitats that affect ecosystem function and processes.

Critical habitat

The USFWS designated critical habitat for the Mexican spotted owl in 2004 on approximately 8.6 million acres (3.5 million hectares) of Federal lands in Arizona, Colorado, New Mexico, and Utah (USFWS 2004). Within the designated boundaries, critical habitat includes only those areas defined as protected habitats (defined as PACs and unoccupied slopes >40 percent in the mixed conifer and pine-oak forest types that have not had timber harvest in the last 20 years) and restricted (now called "recovery") habitats (unoccupied owl foraging, dispersal, and future nest/roost habitat) as defined in the 1995 Recovery Plan (USFWS 1995). The PCEs for Mexican spotted owl critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (USFWS 1995). Since owl habitat can include both canyon and forested areas, PCEs were identified in both areas. The PCEs identified for the owl within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the owl's habitat needs for nesting, roosting, foraging, and dispersing are:

- 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 dbh (4.5 feet above ground) of 12 inches or more;
- A shade canopy created by the tree branches covering 40 percent or more of the ground;
- Large, dead trees (snags) with a dbh of at least 12 inches.
- 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 PCEs 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 PCEs 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.

Steep-walled rocky canyonlands occur typically within the Colorado Plateau EMU, but also occur in other EMUs. Canyon habitat is used by owls for nesting, roosting, and foraging, and includes landscapes dominated by vertical-walled rocky cliffs within complex watersheds, including many tributary side canyons. These areas typically include parallel-walled canyons up to 1.2 miles (2 kilometers) in width (from rim to rim), with canyon reaches often 1.2 miles (2 kilometers) or greater, and with cool north-facing aspects. The PCEs related to canyon habitat include one or more of the following:

- Presence of water (often providing cooler and often higher humidity than the surrounding areas);
- Clumps or stringers of mixed-conifer, pine-oak, piñon-juniper, and/or riparian vegetation;
- Canyon walls containing crevices, ledges, or caves; and,
- High percent of ground litter and woody debris.

Overall, the status of the owl and its designated critical habitat has not changed significantly range-wide in the U.S. (which includes Utah, Colorado, Arizona, New Mexico, and extreme southwestern Texas), based upon the information we have, since issuance of the 2012 LRMP BO for the Santa Fe NF (USFWS 2012b). What we mean by this is that the distribution of owls continues to cover the same area, and critical habitat is continuing to provide for the life history needs of the Mexican spotted owl throughout all of the EMUs located in the U.S. We do not have detailed information regarding the status of the Mexican spotted owl in Mexico, so we cannot make inferences regarding its overall status.

However, this is not to say that significant changes have not occurred within the owl's U.S. range. Wildland fire has resulted in the greatest loss of PACs and critical habitat relative to other actions (e.g., such as forest management, livestock grazing, recreation, etc.) throughout the U.S. range of the Mexican spotted owl. These wildland fire impacts have mainly impacted Mexican spotted owls within the UGM EMU (e.g., Slide and Schultz Fires on the Coconino NF, Rodeo-Chediski and Wallow Fires on the Apache-Sitgreaves NF and Whitewater-Baldy Complex on the Gila NF) and BRW EMU (e.g., Horseshoe 2 Fire on the Coronado NF); but other EMUs have been impacted as well (i.e., SRM EMU, the Santa Fe NF by the Las Conchas Fire, CP EMU by the Warm Fire). However, we do not know the extent of the effects of these wildland fires on actual owl numbers.

Jemez Mountains Salamander

The Jemez Mountains salamander was listed as an endangered species on September 10, 2013 (78 FR 55600) and its critical habitat was designated on November 20, 2013 (78 FR 69569). The salamander is uniformly dark brown above, with occasional fine gold to brassy coloring with stippling dorsally (on the back and sides) and is sooty gray ventrally (underside). The salamander is slender and elongate, is a member of the family Plethodontidae, is strictly terrestrial, and does not use standing surface water for any life stage. Respiration occurs through the skin, which requires a moist microclimate for gas exchange.

This lungless salamander is found primarily in conifer habitats with abundant rocks and surface logs, especially on steep north-facing slopes. They occur between 7,200 and 9,500 feet but has been found as low as 6,998 feet and as high as 10,990 feet (Ramotnik 1988). They are found in relatively high humidity microhabitats and soils that contain deep igneous, subsurface rock that is fractured to allow retreat underground to below the frost line. Much of the life cycle occurs

underground with surface activity inside rotted coniferous logs or under rocks during a brief period of the summer when conditions are warm and wet. Habitat is typically mixed-conifer forest, consisting primarily of Douglas fir, blue spruce, Engelman spruce, white fir, limber pine, Ponderosa pine, Rocky Mountain maple, and aspen (Degenhardt et al., 1996; Reagan 1967). The species has occasionally been found in stands of pure Ponderosa pine and in spruce-fir and aspen stands, but these forest types have not been adequately surveyed. Approximately 75 percent of their diet is comprised of ants; other prey items include beetles, mites, spiders, earthworms, and other small invertebrates. Current threats include wildfire, logging, habitat loss (road construction, development), and chytridiomycete fungal (*Batrachochytrium dendrobatidis*) infection (77 FR 56481). Range movements are poorly documented, but home ranges tend to be very small.

Threats affecting the salamander and its associated habitat within the action area include habitat loss, degradation, and modification, from severe wildland fire, but also alterations to habitat of varying magnitude from fire suppression, forest composition and structure conversions, post-fire rehabilitation, forest and fire management, roads, trails, habitat fragmentation, and recreation. Some of these threats may be exacerbated by the current and projected effects of climate change. The salamander spends much of its life underground and can be found above ground when relative environmental conditions are warm and wet, which is typically from July through September; but occasional salamander observations have been made in May, June, and October. Relatively warm and wet environmental conditions suitable for salamander aboveground activity (but cool and wet microhabitats) are likely influenced by snow infiltration and summer monsoon rains. Additional information on the salamander's natural history and status can be obtained from the final listing rule (77 FR 56482).

Jemez Mountains Salamander Critical Habitat

The Jemez Mountains salamander final critical habitat rule designated approximately 90,716 ac (36,711 ha) as critical habitat in two units in the Jemez Mountains, New Mexico (78 FR 69569). Unit 1 consists of 42,445 ac (17,177 ha) in Rio Arriba and Sandoval Counties, New Mexico, in the western portion of the Jemez Mountains of which 41,466 ac (16,781 ha) is federally managed, with 26,531 ac (10,736 ha) on USFS lands, 14,935 ac (6,044 ha) on VCNP lands, 73 ac (30 ha) on New Mexico Department of Game and Fish lands, and 906 ac (367 ha) on private lands. Unit 2 consists of 48,271 ac (19,535 ha) in Los Alamos and Sandoval Counties, New Mexico, in the eastern, southern, and southeastern portions of the Jemez Mountains of which 46,375 ac (18,767 ha) is federally managed, with 30,366 ac (12, 288 ha) on USFS lands, 8,811 ac (3,565 ha) on VCNP lands, and 7,198 ac (2,912 ha) on National Park Service lands (Bandelier National Monument), and 1,897 ac (768 ha) are on private lands. The status of designated critical habitat has not changed significantly from that published in the final rule.

The primary constituent elements of Jemez Mountains salamander consist of four components:

(i) Moderate to high tree canopy cover, typically 50 to 100 percent canopy closure, that provides shade and maintains moisture and high relative humidity at the ground surface, and:

(A) Consists of the following tree species alone or in any combination: Douglas fir (*Pseudotsuga menziesii*); blue spruce (*Picea pungens*); Engelman spruce (*Picea engelmannii*); white fir (*Abies concolor*); limber pine (*Pinus flexilis*); Ponderosa pine (*Pinus ponderosa*); and aspen (*Populus tremuloides*); and

(B) Has an understory that predominantly comprises: Rocky Mountain maple (*Acer glabrum*); New Mexico locust (*Robinia neomexicana*); oceanspray (*Holodiscus* spp.); or shrubby oaks (*Quercus* spp.).

(ii) Elevations from 6,988 to 11,254 feet (2,130 to 3,430 meters).

(iii) Ground surface in forest areas with:

(A) Moderate to high volumes of large fallen trees and other woody debris, especially coniferous logs at least 10 inches (25 centimeters) in diameter, particularly Douglas fir, which are in contact with the soil in varying stages of decay from freshly fallen to nearly fully decomposed; or

(B) Structural features, such as rocks, bark, and moss mats that provide the species with food and cover.

(iv) Underground habitat in forest or meadow areas containing interstitial spaces provided by:

(A) Igneous rock with fractures or loose rocky soils;

(B) Rotted tree root channels; or

(C) Burrows of rodents or large invertebrates.

New Mexico Meadow Jumping Mouse

The jumping mouse was proposed as an endangered species with critical habitat on June 20, 2013 (78 FR 37363; 78 FR 37328). On June 10, 2014, the jumping mouse was listed as endangered (USFWS 2014; 79 FR 33119). In addition to the summary information provided below, we completed a species status assessment report (SSA Report) for the jumping mouse in May 2014, which is hereby incorporated by reference (USFWS 2014). A Recovery Outline was also completed concurrent with the final rule listing the species as endangered (USFWS 2014a). The SSA Report provides a thorough assessment of jumping mouse biology and natural history

and assesses demographic risks (such as small population sizes), threats, and limiting factors in the context of determining viability and risk of extinction for the species. In the SSA Report, we also compile biological data and a description of past, present, and likely future threats (causes and effects) facing the New Mexico meadow jumping mouse.

The jumping mouse is a small mammal whose historical distribution likely included riparian wetlands along streams in the Sangre de Cristo and San Juan Mountains from southern Colorado to central New Mexico, including the Jemez and Sacramento Mountains and the Rio Grande Valley from Española to Bosque del Apache National Wildlife Refuge, and into parts of the White Mountains in eastern Arizona.

The jumping mouse life history (short active period, short life span, low fecundity, specific habitat needs, and low dispersal ability) makes populations highly vulnerable to extirpations when habitat is lost and fragmented. Based on historical (1980s and 1990s) and current (from 2005 to 2014) data, the distribution and abundance of the New Mexico meadow jumping mouse has declined significantly rangewide. The majority of extirpations have occurred since the late 1980s to early 1990s, as we found about 70 formerly occupied locations are now considered to be extirpated. Since 2005, there have been 29 documented remaining populations spread across the 8 conservation areas (2 in Colorado, 15 in New Mexico, and 12 in Arizona). Nearly all of the current populations are isolated and widely separated, and all of the 29 populations located since 2005 have patches of suitable habitat that are too small to support resilient populations of jumping mice. In addition, 11 of the 29 populations documented since 2005 have been substantially compromised since 2011 (due to water shortages, grazing, or wildfire and post-fire flooding), and these populations could already be extirpated (see USFWS 2014 for a detailed discussion).

Because the jumping mouse requires such specific suitable habitat conditions, populations have a high potential for extirpation when habitat is altered or eliminated. We found that there has been a significant reduction in occupied localities likely due to cumulative habitat loss and fragmentation across the range of the jumping mouse. The past and current habitat loss has resulted in the extirpation of historic populations, reduced the size of existing populations, and isolated existing small populations. Ongoing and future habitat loss is expected to result in additional extirpations of more populations. The primary sources of past and future habitat losses are from grazing pressure (which removes the needed vegetation) and water management and use (which causes vegetation loss from mowing and drying of soils), lack of water due to drought (exacerbated by climate change), and wildfires (also exacerbated by climate change). Additional sources of habitat loss are likely to occur from scouring floods, loss of beaver ponds, highway reconstruction, residential and commercial development, coalbed methane development, and unregulated recreation.

ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the Act, when considering the effects of the action on federally listed species, the USFWS is required to take into consideration the environmental baseline. Regulations implementing the Act (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of State and private actions that are contemporaneous with the consultation in progress.

Description of the action area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR section 402.02). In delineating the action area, we evaluated the farthest reaching physical, chemical, and biotic effects of the action on the environment. The action area for this BO is defined as the areas proposed for mechanical thinning, prescribed burning, and other restoration treatments (collectively the "treatment area") and anywhere outside of this treatment footprint that other project-related effects could spread (such as smoke effects or sedimentation impacts, as analyzed in the BA).

Environmental Setting

Ponderosa pine is the predominant forest type in the area (48 percent), followed by piñon-juniper woodland (32 percent), mixed conifer (12 percent), and small patches of spruce-fir and aspen (<2 percent total) at higher elevations (Table 6). Mixed conifer forest contains one or more species of white fir (*Abies concolor*), Douglas-fir (*Pseudotsuga menziesii*), blue spruce (*Picea pungens*), and limber pine (*Pinus flexilis*).

Table 6. The dominant cover types in the project area excluding riparian[1] as identified in Forest Service databases.

Cover Type	**Acres**	**% Planning area**
Aspen	755	0.7%
Burned up (Las Conchas Fire)	2,092	1.9%
Burned up (recent fire)	524	0.5%
Cottonwood	5	0.0%
Dry Mixed Conifer	**21,950**	**20.1%**
Gambel Oak (shrub)	208	0.2%
Grassland	938	0.9%
Juniper Woodland	118	0.1%
Wet Mixed Conifer	**3,910**	**3.6%**

Oak Woodland	379	0.3%
Piñon/Juniper	**34,497**	**31.6%**
Ponderosa Pine	**43,591**	**39.9%**
Rockland, talus, scree	241	0.2%
Rocky Mountain Juniper	47	0.0%
Strip mines, quarries, gravel pit	57	0.1%
Total	**109,311**	**100.0%**

[1] Riparian vegetation is not delineated at the scale that dominant cover type is quantified. There are about 4,585 acres of riparian habitat in the project area that is included in the cover types listed in this table.

The tree canopy is overly dense, lacking canopy gaps needed to support vegetative ground cover. The deficit of grasses and shrubs in this area reduces biological diversity needed for quality wildlife habitat, as well as the area's ability to support surface fires. Needle cast from ponderosa pine can carry surface fire but duff and short needles from mixed confer will only carry fire under certain conditions that are not good for controlling adverse fire effects. Historic meadows, aspen patches, and riparian vegetation have also greatly diminished from historic pre-settlement conditions due to conifer encroachment in the absence of a frequent surface fire regime.
Forest structure in this area is also highly altered from pre-settlement reference conditions. It is dominated by an uncharacteristically dense and homogenous forest (USFS 2010b). The ponderosa pine forest covering most of the project area is dominated by small to mid-size trees (3-12 inches in diameter). Approximately 96% of the ponderosa pine and mixed conifer forest in the area is in a mid-seral, closed succession class, and less than 1% is in late-open, late-closed, or early succession classes respectively, based on LANDFIRE data calibrated to local conditions.

Mexican spotted owl

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

The Southwest Jemez Mountains Restoration Project analysis area lies entirely within the SRM EMU. Under the new recovery plan, 3,733 acres currently meet nest-roost values and an additional 2,031 acres would be managed toward these values with about 1,670 acres being mechanically treated. Those acres coincide with old growth. The remaining seventy-five percent would be managed toward an uneven-age condition. There are six Mexican spotted owl PACs (2,904 acres) in the project area (USFS 2014, p.21). All six PACs are proposed for mechanical thinning and burning (except for the portion of the Lake Fork PAC which is not in the project area). Table 7 summarizes the occupancy data for the PACs in the project area.
The BA states that the current conditions of Mexican spotted owl restricted habitat in the action area does not meet the desired condition for the owl because it lacks the number of large trees greater than 18 inches dbh per acre.

Table 7. Summarized occupancy data for PACs to be treated or analyzed under the Southwest Jemez Mountains Restoration Project.

PAC Name (Number)	PAC Acres	Most Recent Occupancy Information
Hummingbird (31003043)	352	The PAC was established in 1992. Surveys in 2003, 2008, and 2013 did not detect owls.
Lake Fork (31003064)	600 (208 in project area)	The PAC was established in 2009 based on a pair with two young. Surveys in 2013 did not detect owls.
Paliza (31003065)	608	The PAC was established in 2006. Surveys from 2007 through 2013 did not detect owls.
San Juan (31003062)	604	This PAC was established in 2004. One owl (sex unknown) was detected in 2005 and surveys in 2009 and 2013 did not detect owls.
Virgin (31003038)	759	This PAC was established in 1989 and surveys detected owls from 1990-1996, 2003. Owls were not detected in 2013.
West Mesa (31003028)	542	This PAC was established in 1998. Owls were detected in 1992, 1995, and 2008. Owls were not detected in 2013.

Critical Habitat

The Southwest Jemez Mountains Restoration Project analysis area includes a portion of one Mexican spotted owl CHU (SRM-NM-1). This CHU encompasses approximately 85,758 total acres, but not all of this area is considered to be critical habitat and only a portion of this unit is located within the project area. This unit contains mixed-conifer forest on steep slopes and canyons incised with volcanic rock. Only Federal lands that meet the definition of protected or restricted habitat within these areas are considered to be critical habitat, unless otherwise exempted (WUI project areas, State, and private lands). Within the Southwest Jemez Mountains Restoration treatment area, the BA states that there are approximately 23,700 acres of designated critical habitat primarily comprised of ponderosa pine and dry mixed conifer within the project area. Pure ponderosa pine is not considered to be critical habitat, per the final rule (USFWS 2004). In addition, based upon Figure 2 (USFS 2014, pgs. 23-24), this acreage figure does not seem correct. We would surmise that the actual acreage is much less as Figure 2 clearly shows that the owl habitat that falls within SRM-NM-1 is a subset of the area. Therefore, we do not have an actual acreage total for critical habitat within the project area, but we believe it is significantly less than the 23,700 acres listed by cover type below because some of these cover types are not considered MSO habitat. Nevertheless, the following table provides the best information we have regarding the breakdown of the vegetation types within MSO critical habitat.

Table 8. Cover Type Acres in MSO Critical Habitat within the SWJM Project Area

Cover Type	GIS_Acres
Aspen (Birch)	92.0
Douglas Fir	1,693.9
Gambel Oak (shrub)	224.4
Grassland (cover type undetermined)	202.6
Oak Woodland	320.0
Pinyon/Juniper	1,526.5
Ponderosa Pine	18,345.8
Rockland, talus, scree	15.6
Rocky Mountain Juniper	208.8
White Fir	1,060.4
White Pine	43.7
	23,733.8

The BA states that current conditions in critical habitat lack structural and vegetative species diversity, large trees, and understory plants.

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

The action area consists primarily of National Forest System lands, and there are few State, tribal, or private actions impacting the Mexican spotted owl or its critical habitat. Key factors that have affected the owl within the action area are vegetation removal activities associated with fuels reduction and forest restoration projects, fire and fuels management, maintenance of vegetation along utility corridors, lands projects involving infrastructure repair/maintenance, recreation, and wildfire. The projects have all included conservation measures to minimize effects to the owl and its habitat.

Status of Jemez Mountains salamander within the action area

The action area contains at least 32 locations where salamanders have been detected, some of which were burned during the Las Conchas fire. The action area also contains approximately 14,026 acres of critical habitat, which is considered wholly occupied by the salamander. However, many areas within the action area remain unsurveyed or contain areas where the negative survey data may be unreliable. Furthermore, within its occupied habitat where habitat features are continuous, Jemez Mountains salamander observations are often isolated, thus making new observations difficult. The current conditions of the natural systems in the action area and throughout the range of the salamander are significantly departed from the reference condition and are at risk to a variety of threats, especially fire, but also forest pests and disease

and post-fire flooding and erosion. These current conditions and associated high risk to fire are a significant threat to the salamander and its habitat. Because the action area is adjacent to and includes a portion of the range of the species and the primary threats affecting this species are range-wide, the status of the species in the action area is nearly equivalent to the range-wide status of the species. A current and applicable assessment of the status of the species can be found in the final listing rule for the salamander (77 FR 56482).

Factors affecting the species within the action area

Habitat loss, degradation, and modification through the interrelated effects from severe wildland fire, historical and current fire management practices, forest composition and structure conversions, and climate change have impacted the salamander by curtailing its range and affecting its behavioral and physiological functions. Because the salamander has highly permeable skin used for gas exchange and respiration, it must stay moist at all times or it will die. Salamanders have little control in maintaining water balance except through physically changing where they are in the environment, seeking high-moisture areas to hydrate and avoiding warm, dry areas where they would otherwise dehydrate. Warmer temperatures increase water use and dehydration, as well as increase metabolic processes, which then in turn require additional energy for the salamander. These life-history traits make hydration maintenance the most important activity of the salamander life functions. Therefore, any action or factor that warms and dries its habitat adversely affects the Jemez Mountains salamander and its ability to carry out normal behavior (foraging and reproduction).

Furthermore, historical silvicultural practices removed most of the large-diameter Douglas fir and ponderosa pine trees from the Jemez Mountains, including throughout the action area. This change affects the salamander now and will continue to do so in the future, because a lack of large trees results in a lack of the highest quality cover objects (especially Douglas fir trees) available to Jemez Mountains salamanders now and in the future. For other related plethodontid salamanders, these types of cover objects have been identified as an important habitat component in providing resiliency from the effects of factors that warm and dry habitat, such as climate change.

Finally, this species has a restricted range within one small mountain range in northern New Mexico, with no movement or expansion potential to other areas outside of its current range. This species is not able to tolerate the hot dry conditions at lower elevations that completely surround the Jemez Mountains and occupies habitat to the highest elevations in this mountain range. Within its occupied habitat where habitat features are continuous, Jemez Mountains salamander observations are often isolated. Within the restricted habitat of the Jemez Mountains, this species likely makes only very small movements. Combined, this information suggests recolonization or expansion opportunities, particularly after habitat alteration, and genetic exchange among populations may be limited.

New Mexico meadow jumping mouse in the Action Area

The SSA Report for the jumping mouse includes information on the status of the species in the action area (USFWS 2014). Targeted surveys for the jumping mouse in 2005 and 2006 documented individuals within four areas, along the Rio Cebolla and San Antonio Creek (Frey 2005a; Frey 2007b). The known occupied sites in the Jemez Mountains located since 2005 are associated with perennial streams (Rio Cebolla) and a seep. These areas contain saturated soils that contain suitable vegetation structure and height because they are located within livestock exclosures or are in areas with extensive beaver activity that creates complexes of channels, pools, and shallowly flooded areas that may prevent livestock from entering suitable jumping mouse habitat. Because no surveys have been conducted since 2005 and 2006, the following areas are considered occupied currently by the species:

San Antonio Creek, Santa Fe National Forest, Sandoval County. In 2005, a single jumping mouse was captured at this locality (Frey 2005a, p. 24). This site is located at the south end of San Antonio Campground. The capture location was within a wet meadow that contained a small seep with beaver dams that impounded water with beaked sedge throughout (Frey 2005a, p. 24). Frey (2005a) noted marshy conditions at the capture site, with a high soil moisture index (9.5 out of 10; an index measured using a soil moisture probe inserted 40 millimeters in the ground) and mean vertical cover (72.9 centimeters (28.7 inches)) (Frey 2005a). Based on surveys and museum records from 1985 to 2005 and recent visual surveys, much of the habitat was likely historically occupied (Morrison 1985; 1992; Frey 2005a). In 2005, surveys were conducted in some areas of San Antonio Creek, but the species was not captured within any other area (Frey 2005a). However, it is unknown whether the jumping mouse persists throughout San Antonio Creek. During June 2012 and 2013, very little herbaceous riparian vegetation was present at the 2005 capture location and conditions did not appear to be suitable for jumping mice (USFWS 2012a; 2013e). Patches of sedge (*Carex* spp.) were present, but plants were dried and stunted. No water was visible in the meadow or beaver ponds, and the small seep had dried and scattered cattle sign (cow chips) was also observed (USFWS 2012a; 2013e). There were no saturated soils or marshy conditions described by Frey (2005a).

Rio Cebolla at Lake Fork Canyon, Santa Fe National Forest, Sandoval County. In 2005, two jumping mice were captured within the livestock/vehicle exclosure that contained well-developed riparian habitat dominated by sedges, diverse forbs, grasses, and a small patch of alder (Frey 2005a). This 1.4-ha (3.5-ac) locality is above the bridge on Forest Road 376. Soils were moderately saturated at capture sites, with a soil moisture index averaging 7.65 of 10 and a mean vertical cover 87.1 centimeters (34.3 inches) (Frey 2005a). In 2012 and 2013, the area did not appear to be currently suitable. Cattle had entered the exclosure and heavy grazing eliminated much of the herbaceous vegetation, leaving mostly bare, dry soils (USFWS 2012a; 2013e).

Lower Rio Cebolla, 0.9 kilometers (0.6 miles) southwest of Forest Road 376 bridge, Santa Fe National Forest, Sandoval County. In 2006, three jumping mice were captured within an

area of recent beaver activity that was composed of a network of channels, ponds, and wet meadow/marsh conditions (Frey 2007b). The first capture site contained riparian habitat dominated by tall, dense stand of sedges, mixed with cutleaf coneflower and grasses (Frey 2007b). Soils were saturated, with a soil moisture index averaging 10 out of 10, with a mean vertical cover 92.2 centimeters (36.3 inches) (Frey 2005a). The second capture site was just above a small beaver dam and contained tall, dense stand of sedges, with adjacent patches of cattail and willow herb (*Epilobium ciliatum*) (Frey 2007b). Soils were saturated, with a soil moisture index averaging 10 out of 10 and a mean vertical cover of 74.4 centimeters (29.3 inches) (Frey 2007b). The third capture site was along the edge of a wide channel that had bur marigold (*Bidens cernua*) growing as an emergent within a patch of mixed rushes, diverse forbs, watercress, willow herb, and grass (Frey 2007b, p. 11). The general area containing these capture sites occurs along the lower Rio Cebolla, forming a long, broad valley. Cattle grazing occurs in uplands of the Rio Cebolla valley, but no sign of grazing was found at the jumping mouse capture sites within the wetland associated with beaver dams, even though the sites were not protected from livestock grazing by fencing (Frey 2007b; Frey and Malaney 2009). Frey and Malaney (2009) reported that habitat at capture sites in the wetland was similar to localities within livestock exclosures. The extensive and complex channels, ponds, and flooded areas created by beaver, likely served to naturally inhibit cattle; perhaps, because of their reticence to walk in saturated mud and the presence of forage in the adjacent uplands (Frey 2007b; Frey and Malaney 2009). Therefore, the jumping mouse habitat was probably maintained not only because of the extensive beaver activity, but also because grazing pressure was not heavy and animals were not forced to graze disproportionately in the riparian zone (Frey 2007b). In 2012, habitat conditions appeared currently suitable at these capture sites along the lower end of the Rio Cebolla (USFWS 2012a). No cattle were present in the valley, but old sign was abundant throughout the uplands. Nevertheless, in 2013, habitat conditions appeared marginal due to heavy livestock grazing throughout the riparian zone, which was showing signs of bank collapse and bare soils (USFWS 2013e).

Rio Cebolla above junction with Rio de las Vacas, Santa Fe National Forest, Sandoval County. In 2005, one jumping mouse was captured at this 1.8- ha (4.5-ac) locality (Frey 2005a). The riparian zone was narrow and dominated by sedges, grasses, forbs, and alder, with no sign of beaver activity (Frey 2005a). The soil moisture index at the capture site averaged 8.8 out of 10, with a mean vertical cover 60.5 centimeters (23.8 inches) (Frey 2005a). In 2012, habitat conditions appeared marginally suitable at this location. However, a newly constructed beaver dam was observed 150 m (492 ft) downstream, creating additional suitable habitat within a reasonable movement distance of the previous capture location (USFWS 2012a). In 2013, buck and poles fences were down throughout the area and stream banks had also collapsed in many sections (USFWS 2013e).

Outside of the areas described above, segments lacking continuous suitable habitat are considered unoccupied because they do not contain sufficiently dense riparian herbaceous vegetation to support jumping mice (i.e., the segments lack the specialized microhabitat

features). Moreover, any jumping mice that might disperse from the occupied segments into adjacent unoccupied segments would likely perish from predation or starvation from the lack of sufficient vegetation cover or food sources.

Proposed Critical Habitat

Critical habitat in the action area consists of riparian areas associated with current (since 2005) and historical documentation of individual jumping mice along San Antonio Creek campground and north to the border of the Valles Caldera National Preserve (Subunit 3-A) and along the Rio Cebolla from the confluence with the Rio de las Vacas north to where the Rio Cebolla crosses Forest Road 376 (parts of Subunit 3-B).

Within the action area, there are 342 acres of occupied critical habitat and 2,022.9 acres of unoccupied critical habitat on the Forest excluding private land inholdings. There are 82.7 acres of occupied critical habitat and about 586 acres of unoccupied critical habitat in the project area excluding private lands. Livestock graze all but about 20 acres within the project area. Occupied habitat was calculated by delineating an area 0.5 mile upstream and downstream from 2005 and 2006 capture locations and 100 meters each side of the water's edge.

Subunit 3-A; San Antonio Creek

This subunit begins along the northern part of San Antonio Creek where it exits the boundary of the Valles Caldera National Preserve and follows the creek about 11.5 km (7.1 mi) through mostly Forest Service lands where it meets private land immediately downstream of the San Antonio Campground. The stream segment surrounding the 2005 capture location (Frey 2005a) is considered occupied; however, it is unknown whether the jumping mouse persists throughout the upstream segment of San Antonio Creek. The occupied area is located within a wet meadow near the southwestern part of San Antonio Campground (Frey 2005a). The occupied area is centered around the capture location plus an additional 0.8-km (0.5-mi) segment upstream and downstream of this area where the physical and biological features are found. The upstream segment does not currently contain continuous suitable habitat, but has perennial flowing water with saturated soils (Frey 2005a) and a high potential of being restored to suitable habitat.

Subunit 3-B; Rio Cebolla

This subunit extends from an old beaver dam about 0.6 km (0.4 mi) north of Hay Canyon downstream about 20.7 km (12.9 mi) where it meets the Rio de las Vacas. The stream segments surrounding the 2005 and 2006 capture locations (Frey 2005a; Frey 2007b) are considered occupied; however, it is unknown whether the jumping mouse persists throughout the other segments of the Rio Cebolla. Many of these segments do not currently contain continuous suitable habitat, but they all have perennial flowing water with saturated soils (Frey 2005a; Frey 2007b) and a high potential of being restored to suitable habitat.

The project area only includes the Rio Cebolla from the confluence with the Rio de las Vacas north to where the Rio Cebolla crosses Forest Road 376. The occupied areas occurs at three general locations along downstream area of the lower Rio Cebolla: within Lake Fork Canyon inside a livestock exclosure above the bridge on Forest Road 376; within a network of channels, beaver ponds, and wet meadows about 0.9 kilometers (0.6 miles) southwest of Forest Road 376 bridge; and about 2.7 km (1.7 mi) north of the confluence of the Rio Cebolla and the Rio de las Vacas (Frey 2005a; Frey 2007b). The occupied areas are centered around the three capture locations plus an additional 0.8-km (0.5-mi) segment upstream and downstream of these areas where the physical and biological features are found. The remaining unoccupied areas within Subunit 3-B are found both upstream and downstream of the occupied areas.

Within these areas, the primary constituent elements of the physical or biological features essential to the conservation of the New Mexico meadow jumping mouse consist of the following:

(i) riparian communities along rivers and streams, springs and wetlands, or canals and ditches that contain:

(A) Persistent emergent herbaceous wetlands especially characterized by presence of primarily forbs and sedges (*Carex* spp. or *Schoenoplectus pungens*); or

(B) Scrub-shrub riparian areas that are dominated by willows (*Salix* spp.) or alders (*Alnus* spp.) with an understory of primarily forbs and sedges; and

(ii) Flowing water that provides saturated soils throughout the New Mexico meadow jumping mouse's active season that supports tall (average stubble height of herbaceous vegetation of at least 61 cm (24 inches) and dense herbaceous riparian vegetation composed primarily of sedges (*Carex* spp. or *Schoenoplectus pungens*) and forbs, including, but not limited to one or more of the following associated species: spikerush (*Eleocharis macrostachya*), beaked sedge (*Carex rostrata*), rushes (*Juncus* spp. and *Scirpus* spp.), and numerous species of grasses such as bluegrass (*Poa* spp.), slender wheatgrass (*Elymus trachycaulus*), brome (*Bromus* spp.), foxtail barley (*Hordeum jubatum*), or Japanese brome (*Bromus japonicas*), and forbs such as water hemlock (*Circuta douglasii*), field mint (*Mentha arvense*), asters (*Aster* spp.), or cutleaf coneflower (*Rudbeckia laciniata*); and

(iii) Sufficient areas of 9 to 24 km (5.6 to 15 mi) along a stream, ditch, or canal that contain suitable or restorable habitat to support movements of individual New Mexico meadow jumping mice; and

(iv) Include adjacent floodplain and upland areas extending approximately 100 m (330 ft) outward from the boundary between the active water channel and the floodplain (as defined

by the bankfull stage of streams) or from the top edge of the ditch or canal.

(3) Critical habitat does not include manmade structures (such as buildings, fire lookout stations, runways, roads, and other paved areas) and the land on which they are located existing within the legal boundaries.

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. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. 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, which will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Mexican spotted owl

Effects of the action on the Mexican spotted owl and its habitat

The Southwest Jemez Mountains Restoration Project will implement several different restoration actions in Mexican spotted owl habitat. These actions will include mechanical thinning and prescribed fire; riparian treatments; and meadow restoration. All of these activities will affect habitat composition at multiple scales, but could also result in disturbance to owls from noise and even possibly smoke. In addition, roads and landings will be used, constructed, and decommissioned across this area in order to implement this project. Based on the increase in activity, not only could these road-related activities result in additional noise to owls, but they could also result in an increased opportunity for vehicular-owl collisions. We will summarize the potential effects from these actions to the owl and its habitat.

<u>Mechanical Thinning & Prescribed Burning</u>

The Santa Fe National Forest anticipates thinning about 4,000 acres per year across all forest types, so some amount of Mexican spotted owl habitat would be thinned each year. Please see the attached implementation map for details regarding implementation. However, there is no implementation plan of what acres would be thinned in any given year. The Forest Service will avoid activities within PACs during the breeding season unless protocol surveys infer absence of owls in a given year. Prior to implementation of activities where owls or their habitat may be affected by management actions, all suitable habitats will also be surveyed to protocol.

Approximately 2,904 acres in six PAC occur within the project area. A total of 414 acres in six PACs and 12,455 acres of critical habitat would be thinned within mixed conifer and ponderosa pine cover types. See Tables 4 and 5 for information regarding how many acres within each PAC will be thinned and the acres by cover type within critical habitat will be thinned.

Thinning, including aspen and meadow treatments, within PACs would be limited to trees less than 18 inches dbh. The Santa Fe National Forest intends to manage mixed conifer stands within PACs according to the guidance in Appendix C, Mexican spotted owl Recovery Plan, First Revision (USFWS 2012a). Material (logs) generated during treatment will be removed. Table 8 displays the current and anticipated forest conditions for owl habitat post-treatment. Direct and indirect effects from the thinning actions within the PACs and restricted habitat should be short-term in terms of loss of key habitat components. Over the long-term, these actions are predicted by the Forest Service to maintain and/or enhance desirable habitat components such as large trees, large snags and logs, and at least 40% canopy cover. We do expect adverse effects to occur to habitat from implementation of the proposed action as structure and composition of the forest is modified within nest/roost (PAC) habitat and across the landscape in restricted and target habitat. These effects are likely to be most noticeable over the life of this biological opinion (10 years). However, we do not know how treatments that increase openings, modify patch size and location, and create other landscape level changes will influence owl use (foraging and dispersal as well as nesting and roosting) of the project area over this period of time. However, the information provide in Table 9 indicates that stand basal area (BA) in all habitat types will be lower than the recommended value in Table C3 in the Revised Recovery Plan (USFWS 2012a), which recommends an overall minimum BA of 120 sq. ft./acre in mixed conifer PAC and nest/roost habitat.

Table 9. Current and predicted forest condition in Mexican spotted owl habitat following implementation of the proposed action.

Changes in Stand Metrics after treatment and 20 years after treatment				
Habitat Strata	**Treatment Acres**	**BA-Pre**	**BA-Post t**	**BA-20 years**
Alternative 1 (new recovery plan)				
MSO PAC	410	135	92	108
MSO nest/roost replacement habitat	1,680	178	104	126

BA = Basal Area (The total cross-sectional area of all stems in a stand measured at breast height, in square feet per acre)

Prescribed fire, the deliberate application of fire to reduce forest fuels and reestablish fire as a process, as stated above, is also part of the proposed action. Effects from prescribed burning in restricted and PAC habitats are difficult to quantify due to the uncertainty inherent in prescribed

fire. All PAC acres would also be burned (3,112 acres). The effects analysis in the Effects Analysis section of the BA (pg. 26) states that the entire PAC would be burned, including the core areas (except for the Lake Fork PAC, as the core is outside the project area). However, the proposed action (pg. 12) states that nest areas would not receive mechanical treatment, and to the extent possible, cores would be avoided during prescribed burning. Burning may occur every seven to 12 years. We recommend that the entire PAC area is burned with low-severity fire effects, but we are concerned that without any pre-burn thinning to protect key habitat components within the core areas that prescribed burning may result in moderate to high severity fire effects and increased loss of key habitat components.

The BA estimates that prescribed burning will result in about 15 percent loss of live trees within PACs. The BA predicts that effects to the owl would largely be beneficial as dead trees become snags and canopy gaps are created. Design features are in place to minimize the loss or modification of large trees, snags, and logs during all prescribed burning treatments. In the process of applying fire deliberately to this landscape, past experience and research have shown that large logs, snags, and large trees – all key habitat components of Mexican spotted owl habitat - may be lost or damaged during these activities (Horton and Mannan 1988).

Randall-Parker and Miller (2002) monitored the effects of prescribed fire in ponderosa pine forest on snags, down logs, Gambel oaks, and old ponderosa pine trees at five sites on two national forests (Coconino and Kaibab) and a national monument (Walnut Canyon) in Arizona. All burns were conducted in the fall. At all sites except one, some snags were lined (i.e., duff and debris raked away from the base of the dead tree). Results included the following:

- Twenty-one percent of all snags monitored were consumed by fire or converted to logs and the range of loss across sites was 12 to 38 percent. Nine snags were also created by fire: six of these were old-growth trees that were converted from live to dead trees and two were Gambel oaks.
- Fifty-three percent of all logs monitored were consumed by fire (lost). Log loss did not differ by species.
- Six percent of the 282 Gambel oaks greater than ten inches dbh were lost, and loss ranged from zero to nine percent across the five sites.
- Old growth tree loss across the sites ranged from zero to six percent.

Another study conducted as part of the Birds and Burns Network (Saab et al. 2006), also evaluated the magnitude of change in the quantities of downed wood, snags, and trees within one year after prescribed burn treatments in the Southwest. Study areas were located in ponderosa pine forests in six treatment units located on the Apache-Sitgreaves, Coconino, Kaibab, and Gila NFs. Although few of the results were statistically significant at $p \leq 0.05$, results included the following:

- Nearly half of large downed wood (≥9 inch large end diameter) was consumed by prescribed fire. The authors surmised that drought conditions, followed by low wood moistures prior to fire treatments, may have contributed to the large loss of downed wood.
- Overall tree densities were also significantly reduced after fire treatments. However, the greatest reduction in tree densities was in the smallest size classes (< 3 inches dbh and ≥3 to <9 inches dbh), with little change in larger (≥9 inches dbh) tree densities. Small diameter trees tend to function as ladder fuels in dense stands and can carry flames into the crowns of mature trees; therefore, the removal of these smaller trees is likely to reduce the likelihood of stand-replacing fire, which is one goal of the proposed action. Large tree (≥9 inches dbh) densities changed relatively little.
- Smaller snag (<9 inches dbh) densities increased 30 to 60 percent. With time, these dead trees could contribute to increased risk of spot fires.

In summary, prescribed burning is expected to reduce the risk of wildfire by reducing accumulations of fuels, but it will also modify and/or result in the loss of the key habitat components that comprise Mexican spotted owl habitat, both in restricted habitat and within PACs. Design features/conservation measures will be implemented in an attempt to minimize these losses, but it is difficult to reduce and protect fuels on the same piece of ground. We do think that fire staff involved in implementing the project have gained experience over the years and will use best management practices to ensure that low severity fire effects are achieved. However, based upon the sheer number of acres proposed for burning each year, and because the intention is to apply prescribed fire to all of the PACs, target (nest/roost replacement) habitat, and restricted habitat at least two times in 20 years, we think that there is a likelihood that key habitat components will be unintentionally lost to fire and that this could result in short-term adverse effects to Mexican spotted owls.

Riparian Treatments

Riparian treatments (235 acres) are planned to improve function and connectivity of these areas in PACs. These treatments are not inclusive of the 414 acres of mechanical thinning that will occur in PACs. In addition, 48 headcuts were identified to be treated based on degraded stream bank stability and ongoing sediment erosion in the PACs. These headcut treatments are not defined in the BA so it is unclear what effects to owls or their habitat may occur from these treatments.

Transportation and Roads

Maintaining, using, and constructing a transportation system to move people, equipment, and forest products on and off the Santa Fe National Forest in order to implement the project will result in effects to owls. Effects from road maintenance and construction, construction of landings, high volumes of traffic, and decommissioning can result in minor impacts to habitat

(widening, tree removal, fill and grading), noise disturbance to owls in the presence of large amounts of traffic, and possible death from collisions of owls and vehicles. Temporary road construction/maintenance and road decommissioning within PACs will be conducted outside the Mexican spotted owl breeding season, so disturbance from these activities to known breeding owls will be reduced. However, there is still likely to be noise from these activities that affects owls in PACs.

Within PACs, 19 miles of roads and 13 landings are planned for use as part of the transportation infrastructure for the project. Seven miles of road decommissioning and one road section re-opening is planned within PAC habitat. No temporary roads would be constructed in PACs; however, some closed system roads within PACs would be used and maintained to facilitate restoration activities.

New gravel pits will be needed in the project area to support infrastructure needs as well. These areas have not been identified; however, the BA states that gravel pits will not be established where effects to Mexican spotted owls are anticipated.

Road-stream crossing removal or improvement is proposed for 35 stream crossings within the project area including some located within PACs and critical habitat. Actions to remove or improve a crossing could include the use of mechanical equipment (i.e., backhoe), to re-contour, water-bar, augment channel gravel, armor, stabilize banks, replant vegetation, and/or to construct fence.

Disturbance

Activities that could result in disturbance to nesting, roosting, and foraging Mexican spotted owls include transporting and operating harvest machinery, hauling harvested forest materials, building fire line, managing prescribed burns, smoke, personnel in the field, and road maintenance and construction. The project proposes a maximum of 23,600 acres of mechanical treatment. The Forest Service states in the BA that all thinning and prescribed burning, riparian restoration, aspen restoration, meadow restoration, road maintenance, and road decommissioning in PACs will occur outside the breeding season. Therefore, the analysis in the BA determined that there will be minimal effects to breeding Mexican spotted owls from noise associated with these activities.

There are a growing number of studies attempting to describe and quantify the impacts of non-lethal disturbance on the behavior and reproduction of wildlife, and Mexican spotted owls in particular. Delaney et al. (1997) reviewed literature on the response of owls and other birds to noise and concluded the following: 1) raptors are more susceptible to disturbance-caused nest abandonment early in the nesting season; 2) birds generally flush in response to disturbance when distances to the source are less than approximately 200 feet and when sound levels are in excess of 95 dBA; and 3) the tendency to flush from a nest declines with experience or

habituation to the noise, although the startle response cannot be completely eliminated by habituation. Delaney et al. (1999) found that ground-based disturbances elicited a greater flush response than aerial disturbances. USFWS guidance is to limit potentially disturbing activities to areas ≥0.25 mile from Mexican spotted owl nest sites during the breeding season (March 1 - August 31). This corresponds well with the Delaney et al.'s (1999) 0.25 mile threshold for alert responses to helicopter flights. In addition, Delaney et al. (1999) found that Mexican spotted owls did not flee from helicopters when caring for young at the nest, but fled readily during the post-fledgling period. This may be a result of optimal fleeing decisions that balance the cost-benefit of fleeing. Frid and Dill (2002) hypothesize that this may be explained using predator risk-disturbance theory and perhaps the cost of an adult spotted owl fleeing during the nestling period may be higher than during the post-fledgling period.

Our analysis of the project analysis area and PAC location information indicates that even if actions do not occur within PACs during the breeding season as is proposed, project-related noise adjacent to and within 0.25 mile of PACs could affect owls during the breeding season. Noise generated during thinning activities adjacent to PACs could result in disturbance to breeding owls, interfering with nesting and foraging activities pre- and post-fledging. Some PACs likely have topographic screening from adjacent thinning units (e.g., within a drainage, over a ridge, etc.), which could result in reduced noise impacts in some areas, but Mexican spotted owls will experience greater noise and activity levels within the project area than they have likely experienced in the past.

Burning in PACs will occur outside the Mexican spotted owl breeding season (during the period September 1 – February 28) and would include core areas, eliminating the need to build fire lines inside most PACs. In addition to possible habitat effects, burning could potentially disturb owls due to smoke emissions. Smoke tends to settle into low-lying areas during the nighttime and could potentially affect owls associated with PACs located in and adjacent to the project area during the breeding season when spring burns are conducted. Smoke effects would be short-term (3 to 5 days), but initial burns may generate significant smoke due to current fuel loads. Maintenance burns should result in less smoke (and less impact) as there would be less fuel to burn on these second entry burns.

Summary

The Southwest Jemez Mountains Restoration Project is a step forward in attempting to restore forest structure, composition and resiliency by conducting thinning and burning actions. The project has also included some measures to protect the Mexican spotted owl and its habitat by deferring management activities in PACs during the breeding season and attempting to avoid breeding season disturbance to Mexican spotted owls from all associated activities.

However, the Southwest Jemez Mountains Restoration Project has the potential to negatively affect the owl and its habitat when implemented. There is likely to be short-term disturbance to

breeding owls (even with the efforts included to minimize these effects), some loss of key habitat components (large trees, snags, and logs), and some degree of potential for direct fatality from vehicular collisions. Implementation of the project should result in benefits to the owl through habitat enhancement and fire risk reduction. Because there currently is uncertainty regarding treatment effects and risks to owl habitat with or without forest treatment until rigorous monitoring results from projects such as this have been compiled and analyzed, we will continue to struggle with how to conduct thinning and burning activities in occupied and suitable owl habitat.

Effects of the action on Mexican spotted owl critical habitat

In our analysis of the effects of the action on critical habitat, we consider whether or not a proposed action will result in the destruction or adverse modification of critical habitat. In doing so, we must determine if the proposed action will result in effects that appreciably diminish the value of critical habitat for the recovery of a listed species. To determine this, we analyze whether the proposed action will adversely modify any of the PCEs that were the basis for determining the habitat to be critical. To determine if an action results in adverse modification of critical habitat, we must also evaluate the current condition of all designated CHUs, and the PCEs of those units, to determine the overall ability of all designated critical habitat to support recovery. Further, the functional role of each of the CHUs in recovery must also be considered because, collectively, they represent the best available scientific information as to the recovery needs of the species.

Below, we describe the PCEs related to forest structure and maintenance of adequate prey species and the effects from implementation of the Southwest Jemez Mountains Restoration Project. The PCEs for steep-walled rocky canyonlands are not analyzed in this BO because this habitat will not be impacted by the proposed action.

We estimate that about 15,000 to 18,000 acres of critical within the treatment area are proposed for prescribed burning. Table 8 provides the best information we have regarding the breakdown of the vegetation types within MSO critical habitat, although we think it is significantly less than the 23,700 acres because some of these cover types are not considered MSO habitat. About 25 percent of the acres (3,500 acres) are proposed for thinning.

<u>Primary Constituent Elements related to forest structure:</u>

PCE: 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 percent to 45 percent of which are large trees with dbh of 12 inches or more.

Effect: Actions implemented under the proposed project are expected to retain the range of tree species (i.e., conifers and hardwoods associated with Mexican spotted owl habitat) and would

not reduce the range of tree sizes needed to create the diverse forest and multi-layered forest canopy preferred by owls. Some loss of trees of all types and dbh size classes would occur during mechanical thinning and prescribed fire activities. However, actions implemented under the project are expected to maintain a range of tree species and sizes needed to maintain this PCE in PACs, protected steep-slope, and restricted habitat across the treatment area because the Forest Service is implementing the Recovery Plan guidelines that strive to retain large trees, canopy cover appropriate for owl habitat, and a diverse range of tree species. Removal of trees and various tree species may also occur as part of the riparian, meadow, and aspen restoration activities; but these effects should be small in extent and intensity. Therefore, the function and conservation role of this PCE would not be compromised by the proposed action.

PCE: A shade canopy created by the tree branches covering 40 percent or more of the ground.

Effect: We expect that tree shade canopy would be reduced following thinning and burning treatments implemented. However, we do not expect canopy cover in Mexican spotted owl forested habitat to be reduced below 40 percent because the Forest Service has adopted the Recovery Plan recommendations that include managing for higher basal area and increased canopy cover in Mexican spotted owl habitat versus pure ponderosa pine or other forest and woodland habitats. We would expect that some reduction in existing canopy cover (5 to 10 percent) may actually aid in increasing understory herbaceous vegetation and forb production, which could benefit Mexican spotted owl prey species. The function and conservation role of this PCE would not be compromised by the proposed action.

PCE: Large, dead trees (snags) with a dbh of at least 12 inches.

Effect: Large snags could be both created and lost following proposed prescribed burning (Horton and Mannan 1988, Randall-Parker and Miller 2002). Snags would be created as large and small trees are killed through prescribed burning. This may benefit Mexican spotted owls, particularly their prey species as most snags created through the prescribed fire are likely to be ≤9 inches dbh (Saab et al. 2006). Snags used by Mexican spotted owls for nesting are typically very old, large dbh, highly decayed snags with cavities. Snags with these characteristics tend to be limited in ponderosa pine and mixed conifer forests in northern Arizona (Ganey and Vojta 2004). In individual burning projects, the Forest Service would attempt to minimize loss of these large snags through conservation measures (such as using lighting techniques to avoid snags). Conservation measures/design features will be implemented to protect the largest and oldest snags. Therefore, although we anticipate there would be a measurable loss of snags due to implementation of the project, efforts to protect this rare resource would be made to minimize this loss, and the function and conservation role of this PCE would not be compromised by the proposed action.

Primary Constituent Elements related to maintenance of adequate prey species:

PCE: High volumes of fallen trees and other woody debris.

Effect: Fallen trees and woody debris would likely be reduced by the proposed burning treatments (broadcast, piling, and maintenance burning) as reduction of coarse woody debris is a large component of the proposed action. Research and monitoring indicates that prescribed burning could reduce logs by as much as 30 to 50 percent (Randall-Parker and Miller 2002, Saab et al. 2006). The loss of larger logs could result in short-term adverse effects to this primary constituent element and could result in localized impacts to prey species habitat. However, across the treatment area, it is likely that prescribed burning would also create fallen trees and woody debris as trees are killed post-burn and fall. In fact, based upon current data for many of these areas, there is an excess supply of coarse woody debris due to the exclusion of frequent, low-severity fire, which can increase the likelihood of high-severity fire within restricted habitat. Therefore, some removal of woody debris would result in an overall benefit to the function and conservation role of this PCE, though short-term adverse effects would likely occur within some project areas.

PCE: A wide range of tree and plant species, including hardwoods.

Effect: We expect this PCE would be positively affected by the actions taken under the Southwest Jemez Mountains Restoration Project. Plant species richness would increase following thinning and/or burning treatments that result in small, localized canopy gaps. The project includes conservation measures that focus on retaining Gambel oaks and other hardwood and coniferous species but some level of short-term loss could occur during logging operations, prescribed fires, or road construction/maintenance. However, the function and conservation role of this PCE would not be compromised by the proposed action.

In addition, although aspen is not a cover type known to be used by Mexican spotted owls, it occurs in inclusions within PAC and restricted habitat. Up to 2,210 acres of aspen that could be potentially treated within critical habitat, but only 1,800 of aspen treatments are proposed project wide. These treatments may enhance Mexican spotted owl prey species habitat, albeit in localized areas, within critical habitat.

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

Effect: Short-term decreases in plant cover would result from prescribed burning. We expect long-term increases in residual plant cover because fire treatments would provide conditions suitable for increased herbaceous plant growth by removing a thick layer of dead plant debris within treated areas. The mosaic effect created by burned and unburned areas and by opening up small patches of forest within protected habitat is also expected to increase herbaceous plant species diversity (Jameson 1967, Moore et al. 1999, Springer et al. 2001) and, in turn, assist in the production and maintenance of the Mexican spotted owl prey base. The combination of low-

intensity prescribed burns and thinning during restoration projects would most likely result in only short-term effects to the Mexican spotted owls with regard to modifying prey habitat within treatment areas. In frequent-fire landscapes, herbaceous understory response and plant regeneration tends to be positive following tree removal and prescribed fire (Springer et al. 2001). There is the potential for wild and domestic ungulates to have adverse effects on the production of plant cover post-burning if ungulates were allowed to graze burned areas too soon following fire. However, the Forest Service will implement forest plan utilization standards and guidelines to maintain owl prey availability, maintain potential for beneficial fire, and strive to attain good to excellent range conditions. Therefore, the function and conservation role of this PCE across the Southwest Jemez Mountains Restoration Project area would not be compromised by the proposed action.

Effects of the action on the role of critical habitat in recovery

Adverse effects and associated incidental take from the Southwest Jemez Mountains Restoration Project are not expected to negatively affect Mexican spotted owl recovery or further diminish the conservation contribution of critical habitat to the recovery of the Mexican spotted owl. The project includes objectives and species protection measures in accordance with the Recovery Plan (USFWS 2012a). These actions were identified by the Recovery Team as being necessary to recover the Mexican spotted owl, and the project will implement these actions in designated critical habitat. Designated critical habitat includes all protected (PACs and protected steep-slope habitat) and restricted habitat (unoccupied spotted owl habitat) within the CHU. These actions include the following:

- The Forest Service within the project area has and continues to designate 600 acres surrounding known Mexican spotted owl nesting and roosting sites. PACs are established around owl sites and are intended to protect and maintain occupied nest/roost habitat. Nesting and roosting habitat is rare across the range of the Mexican spotted owl, and by identifying these areas, which are also critical habitat, for increased protection, the Forest Service is aiding in recovery.

- The project has identified and is managing mixed-conifer forests that have potential for becoming Mexican spotted owl replacement nest-roost habitat, or are currently providing habitat for foraging, dispersal, or wintering habitats. As stated above, nesting and roosting habitat is a limiting factor for the owl throughout its range. By managing critical habitat for future replacement nest/roost habitat, the Forest Service is aiding in recovery.

- The project's intent is to integrate the best available recovery habitat management objectives where possible into forest restoration and/or fuels reduction projects with the overall goal to protect owl PACs from high-severity wildland fire and to conduct actions to improve forest sustainability (e.g., thinning and prescribed burning). This

management will ensure that Mexican spotted owl habitat continues to exist on the forest and that critical habitat will continue to retain its function for conservation and recovery.

Over the long-term, these actions should increase the sustainability and resiliency of Mexican spotted owl habitat (particularly through fuels management and forest restoration actions). Therefore, implementation of the Southwest Jemez Mountains Restoration Project is not expected to further diminish the conservation contribution of critical habitat to the recovery of the Mexican spotted owl.

Jemez Mountains salamander and Designated Critical Habitat

Effects of the action on the Jemez Mountains salamander

The life history, behaviors, and physiological functions of the Jemez Mountains salamander are reliant upon the environment in which they occur and cannot be separated. Any action that affects occupied habitat can affect the salamander by driving its behaviors to manage for hydration, physiological needs, feeding, mating, or sheltering. Direct affects to salamanders is greatly reduced because the forest will not be conducting most activities when salamanders may be active at the surface (June 15 through October 30) or have incorporated measures to avoid or minimize impacting the species.

Tables 9 and 10 depict information provided by the Forest during the consultation process with the USFWS, with Table 10 providing updated figures as additional information became available. Table 11 was created by the USFWS to summarize figures obtained either from Table 9, 10, or from other communications from the Forest.

Mechanical Treatments

Table 9. Potential treatment acres in Jemez Mountains salamander critical habitat provided in Draft BA dated June 2014.

Treatment Type	Acres
Aspen	3,322
Meadow	553
Riparian	592
Salamander	131
Old Growth	1,592
Invasive Weeds	29
Headcuts	159
Recreation Sites (number)	7
Road Decommissioning (miles)	6
Harvest	3,709

Prescribed Fire	11,724
Temporary Roads	0
Existing Roads (miles)	56
Landings (number)	152

Table 10. The number of acres of each cover type in Jemez Mountains salamander designated critical habitat within the project area provided in Supplemental Information document dated January 16, 2015.

Cover Type	**Acres in C.H.**	**Acres in C.H. in treatment units**	**Percentage C.H. in treatment units**
Burned	2,100	16	<1%
Grassland	873	24	3%
Aspen	250	33	13%
Ponderosa pine	1,753	467	27%
Dry Mixed Conifer	6,528	2,337	36%
Wet Mixed Conifer	2,522	0	0%
Total	14,026	2,877	21%

Table 11. Combined information for treatments in Jemez Mountains salamander designated critical habitat (CH) and potential habitat (PH) noting number of acres by action by cover type analyzed.

Treatment Type	**Potential treatment Acres in CH from June 2014 draft BA [1]**	**Cover Type from Jan 2015 BA supplement**	**Existing Condition Acres in Critical Habitat (CH)**	**Acres in CH in harvest treatment units**	**Acres CH Analyzed for Effects Mechanical Treatments**	**Acres CH Analyzed for Effects for Burning**	**Acres PH Analyzed for Effects Mechanical Treatments [2]**	**Acres PH Analyzed for Effects for Burning**
Aspen	3,322	Aspen	250	33	33	250	83	83
Meadow	553	Grassland	873	24	24	873	75	75
Riparian	592				592		33	
Salamander	these proposed treatments were dropped							
Invasive Weeds	these proposed treatments were dropped							
Headcuts	16.0				16.0		1.4	
Recreation Sites	0.7				0.7		0.7	
Road Decommissioning	4.0				4.0		2.0	

Harvest	3,709				see below		see below	
Prescribed Fire	11,724 [3]					14,026		2,118
Temporary Roads								
Existing Roads maintenance	41.0				41.0		2.0	
Landings	38.0				38.0		2.5	
		Burned	2,100	0	0	2,100	0	0
		Ponderosa pine	1,753	467	467	1,753	100	489
		Dry Mixed Conifer	6,528	2,337	2,337	6,528	156	1,389
		Wet Mixed Conifer	2,522	0	0	2,522	82 [4]	82
Total			**14,026**	**2,861**	**3,553**	**14,026**	**538**	**2,118**
Old Growth [5]	1,592 [6]				1,592	1,592	599 [6]	

(1) Acres from Proposed Action

(2) Potential habitat is defined according to the model created by The Nature Conservancy as all areas outside critical habitat with .4 or higher probability.

(3) Acres to be treated with prescribed fire, does not include mechanical treatments

(4) Treatments follow design criteria for MSO restricted habitat

(5) The acres of Old Growth treatments are included within the Ponderosa Pine and Dry Mixed Conifer treatment acres.

(6) Acres allocated to Old Growth - not all will be treated

Headcuts *- There are 159 potential treatment sites in CH and 14 in PH. Each site is estimated at 0.1 acres for 16 acres in CH and 1.4 acres PH.*
Recreation Sites *- There are 7 potential treatment sites in CH and 7 in PH. Each site is estimated at 0.1 acres for 0.7 acres in CH and 0.7 acres PH.*
Road Decommissioning *- There are 6 miles of potential decommissioning in CH and 3 in PH. Each mile is estimated at .6 acres for4 acres in CH and 2 acres PH.*
Existing Roads *- There are 56 miles of roads that potentially will receive maintenance in CH and 2.7 in PH. Each mile is estimated at .7 acres for 41 acres in CH and 2 acres PH.*
Landings *- There are 152 potential landing sites in CH and 10 in PH. Each site is estimated at 0.25 acres for 38 acres in CH and 2.5 acres PH.*

Uneven-aged Mechanical Treatment with Openings and Burning in Ponderosa Pine and Stand Improvement Thinning and Burning in Ponderosa Pine

Up to 467 acres on slopes less than 40% will be mechanically treated in ponderosa pine forests in critical habitat for the salamander and up to 100 acres in potential habitat as either uneven-aged mechanical treatment with openings and burning, or as stand improvement thinning and burning.

Treatments of thinning and burning will occur outside of the seasonal restrictions for the salamander, reducing the likelihood that salamanders will be at or near the surface, and thus reduce the likelihood of direct affects to the salamander. After forest thinning by mechanical treatments, it is anticipated that overall, soil moisture will increase in these areas; however, some areas of habitat may experience periods of increased warmth and dryness which may restrict salamander activities and micro-distributions. In areas where logs are removed, some compaction to the soil will occur from the use of heavy machinery. The number and location of skid trails, log landing, and related areas of compaction have not been identified by treatment type, and thus is analyzed in the summary of all treatments. An additional 1,286 acres in designated critical habitat and 389 acres in potential habitat will be treated with prescribed fire every 5-10 years, totaling 1,753 acres in designated critical habitat and 489 acres in potential habitat. The Forest expects that high intensity fire may occur on 10% of the area, thus we estimate that up to approximately 175 (10% of 1,753 acres) of designated critical habitat for the salamander in ponderosa pine forests may burn with high intensity every 5 to 10 years and 49 acres (10% of 489 acres) in potential habitat. Areas burned with high intensity are expected to occur in patches and have impacts that are small in scale. These high intensity patches may indirectly affect salamanders in the immediate vicinity by localized warming and drying of habitat and disrupting normal behavior. However, we also anticipate that because the high intensity patches will be small in scale, we also expect them to be temporary in nature and not contribute to significant long-term adverse effects to the species or designated critical habitat PCEs. Overall, treatments in ponderosa pine forests in designated critical habitat are expected to have short-term adverse effects to approximately 175 acres and to approximately 49 acres of potential salamander habitat, , but have long-term benefits to the species by reducing the risk of large-scale, high-severity wildfire over large portions of habitat.

Uneven-aged Mechanical Treatments with Openings and Burning in Dry Mixed Conifer

Up to 2,337 acres on slopes less than 40% will be mechanically treated in dry mixed conifer forests in critical habitat for the salamander and up to 156 acres in potential habitat. Treatments of thinning and burning will occur outside of the seasonal restrictions for the salamander, reducing the likelihood that salamanders will be at or near the surface, and thus reduce the likelihood of direct affects to the salamander. After forest thinning by mechanical treatments, it is anticipated that overall, soil moisture will increase in these areas; however, some areas of habitat may experience periods of increased warmth and dryness which may restrict salamander activities and micro-distributions. In areas where logs are removed, some compaction to the soil will occur from the use of heavy machinery. The number and location of skid trails, log landing, and related areas of compaction have not been identified by treatment type, and thus is analyzed in the summary of all treatments. An additional 4,191acres in designated critical habitat and 1,233 acres in potential habitat will be treated with prescribed fire every 7-12 years. The Forest expects that high intensity fire may occur on 10% of the area, thus we estimate that up to approximately 653 acres (10% of 6,528acres) of designated critical habitat for the salamander and 139 acres (10% of 1,389 acres) in potential habitat in dry mixed conifer forests may burn with high intensity every 7 to 12 years. Areas burned with high intensity are expected to occur in

patches and have impacts that are small in scale. These high intensity patches may indirectly affect salamanders in the immediate vicinity by localized warming and drying of habitat and disrupting normal behavior. However, we also anticipate that because the high intensity patches will be small in scale, we also expect them to be temporary in nature and not contribute to significant long-term adverse effects to the species or designated critical habitat PCEs. Overall, treatments in dry mixed conifer forests in designated critical habitat are expected to have short-term adverse effects to approximately 653 acres, and to approximately 139 acres of potential salamander buthabitat, but have long-term benefits to the species by reducing the risk of large-scale, high-severity wildfire over large portions of habitat.

Stand Improvement Thinning and Burning in Dry and Wet Mixed Conifer

Approximately 2,522 acres of designated critical habitat and 82 acres of potential habitat in wet mixed conifer forests will be treated with prescribed fire every 7-12 years. Ignitions will not occur in wet mixed conifer forests, but small stringers of this forest type that enter into other forest types will be allowed to burn. The Forest expects that high intensity fire may occur on 10% of the area, thus we estimate that up to approximately 252 acres (10% of 2,523 acres) of designated critical habitat for the salamander and 8 acres of potential habitat in wet mixed conifer forests may burn with high intensity every 7 to 12 years. Areas burned with high intensity are expected to occur in patches and have impacts that are small in scale. These high intensity patches may indirectly affect salamanders in the immediate vicinity by localized warming and drying of habitat and disrupting normal behavior. However, we also anticipate that because the high intensity patches will be small in scale, we also expect them to be temporary in nature and not contribute to significant long-term adverse effects to the species or designated critical habitat PCEs. Overall, treatments in wet mixed conifer forests in designated critical habitat are expected to have short-term adverse effects to approximately 252 acres, and 8 acres in potential habitat. but have long-term benefits to the species by reducing the risk of large-scale, high-severity wildfire over large portions of habitat.

Landscape Prescribed Burning

Landscape prescribed burning is proposed to occur on approximately 76,900 acres for fuels reduction and landscape restoration and a total of 14,026 acres of the project occurs in designated critical habitat for the salamander and are addressed under specific categories (see Table 7). For all landscape prescribed burning, some mechanical fuel reduction will be needed for line preparation (thinning and limbing) and will occur next to control lines, heritage sites, and other areas to reduce fire intensity.

All treatment areas are planned to be prescribed burned over the next ten years. It is anticipated that slash from mechanical treatment will be “jackpotted”, where the majority of slash is loosely piled, but some branches are scattered for promote incomplete fuel consumption, leaving some wood on the site. Burns can be planned when fuels are still slightly wet, to allow retention of greater amount of wood to be left for wildlife resources. Prescribed burning typically occurs in the fall, when fuels have dried from the summer rains; however, spring burning could be conducted if the prescription parameters are met. There will be no ignition within the wet mixed

conifer; however, stands and clumps of wet mixed conifer will not be lined to exclude fire. Measures will be followed such that direct effects to salamanders will be unlikely (e.g. burning outside of salamander timing restrictions, burning within salamander timing restrictions, but when salamanders are not likely to be surface active, limiting the amount of time a jackpot pile remains unburned (to minimize salamanders utilizing piles as habitat). Indirect effects to salamanders will result from direct and indirect effects to designated critical habitat and may include areas of brief but extreme heating under jackpot piles.

It is anticipated that with landscape level treatments, fire behavior during extreme weather will be moderated following project implementation. The post project stand structure modeled effectively reduced the risk of crown fire initiation and spread by promoting surface fire across 70–77% of the landscape. It is especially important to note the significant improvements in fire behavior for those cover types with proposed treatments, specifically dry mixed conifer and pondersoa pine.

Treatments in Wet Mixed Conifer

No mechanical thinning and harvest will occur within wet mixed conifer in designated critical habitat for the salamander.

Treatments to Maintain or Increase Aspen Cover Type

Mechanical treatments in Aspen cover type will occur in approximately 33 acres of designated critical habitat and up to 83 acres in potential habitat that includes tree cutting and log removal (harvested) on slopes less than 40 percent. In areas where logs are removed, some compaction to the soil will occur from the use of heavy machinery. The number and location of skid trails, log landing, and related areas of compaction have not been identified by treatment type, and thus is analyzed in the summary of all treatments. Prescribed burning may occur on a limited basis to meet other objectives, but will not exceed 250 acres of aspen in critical habitat or 83 acres in potential habitat. The treatments will either maintain existing aspen stands or create new stands of aspen. Treatments to maintain aspen will be done in stands where aspen is dominant. This treatment will focus on stimulating new aspen stands on the north and west portions of the project area because the eastern portion is adjacent to the Las Conchas wildfire where aspen in now regenerating. The Forest expects that the aspen openings will have higher soil moisture than the existing conifer stands.

Treatments in Piñon-Juniper

No mechanical thinning and harvest will occur within piñon-juniper in designated critical habitat for the salamander.

Treatments for Old Growth

Areas within Jemez Mountains salamander designated critical habitat have been identified as being prioritized for receiving old growth treatments. The forest plan calls for allocating 20

percent of each cover type within an ecosystem management unit to be managed as old growth, preferably in patches greater than 40 acres. In your analysis the entire project area is considered an ecosystem management unit. Since, landscape treatments are generally limited to ponderosa pine and mixed conifer within the project area, twenty percent each of ponderosa pine and mixed conifer will be managed for old growth. Approximately 1,592 acres will be treated within designated critical habitat for the salamander. Prescribed burning is planned for all treatment areas. This treatment is expected to have similar indirect effects to the salamander that include some high intensity patches that will be small in scale and temporary in nature and not contribute to significant long-term adverse effects to the species or designated critical habitat PCEs. We also expect that overall, this treatment in designated critical habitat may have short-term adverse effects to approximately 1,592 acres in ponderosa pine and mixed conifer forests, but have long-term benefits to the species by promoting large diameter trees that will provide features for long-term habitat sustainability and resiliency and by contributing to reduction in the risk of large-scale, high-severity wildfire.

Treatments for Maintaining or Increasing Meadow Habitat

Activities will be to cut and potentially harvest trees around the meadow margin that are encroaching on meadows as a result of altering the historic fire cycle. Treatments for maintaining or increasing meadow habitat in designated critical habitat are expected to be in lower lying areas (e.g. low spots in the topography), long and narrow in shape, and not to exceed 24 acres. Meadow treatments in the project area, but outside of critical habitat have not been completely identified; however, based areas of meadow within the project area that may receive treatment and on a known example, the Forest estimates that approximately 600 acres around the perimeter of existing or historical meadows may have trees removed for meadow restoration. While removing trees from around the perimeter of enchroached upon meadows may reduce the canopy, this treatment is not expected to have a significant impact on salamander habitat or use of the habitat because the area was historically meadow type habitat with tree encroachment in recent years and salamanders use both forested habitat as well as high-elevation meadow habitat.

Treatments to Reduce Erosion Effects from Headcuts

Approximately 159 headcut and stabilization treatments may be conducted within designated critical habitat for the salamander and 14 in potential habitat. Each headcut treatment is expected to be approximately 0.10 acres in size, totaling approximately 16 acres in designated critical habitat and 1.5 acres in potential habitat . Local material will not be used or taken from designated critical habitat for the salamander, and access to these locations will be by the most direct route and use existing roads to the greatest extent possible. The Forest has not estimated the number of headcut treatments within the rest of the project area, however the map on page 28 of the DEIS depicts the areas where treatments area anticipated. In areas outside of critical habitat, local material, such as rocks, would be used to repair headcuts if available. Some of these headcuts are from hill slope riling, while others are related to perennial and ephemeral stream channels. Headcut treatments in perennial and some ephemeral stream systems are not likely salamander habitat, lacking the subsurface structure and would not affect salamander. Most of this work would be done using a small tractor with backhoe and work would be

conducted when the soils are dry to minimize effects to surface active salamanders. It is anticipated that most of the hill slope work will be done near roads but that some small amount of cross country travel with the tractor is expected. The extent is unknown at this time, but would be done when the soils are dry and salamander surface activity is unlikely. Because the tractors are relatively small and the ground will be dry, the Forest does not anticipate any measurable soil compaction.

Headcut work in perennial waters may require larger equipment such as a track hoe. This type of equipment would use existing roads as much as possible and operate in riparian areas, which is generally not suitable habitat for salamander. If the equipment needs to cross potential salamander habitat, the equipment would be allowed to dry and any mud removed before moving the equipment from the site to reduce the potential for spreading aquatic disease to salamander habitat.

Overall, headcut treatments could affect salamanders through very small scale temporary modifications to habitat. Headcut treatments should generally benefit salamanders by stabilizing habitat that is currently being degraded or lost by down cutting.

Treatments to Enhance Native Riparian Vegetation and Restore Areas Damaged by Dispersed Recreation

The Forest has not identified the exact location of areas that will be treated for dispersed recreation, but estimate 7 sites, of approximately 0.10 acres in size each within critical habitat for the salamander (0.7 acres), and an additional 143 sites throughout the project. Most of the sites are in riparian habitat and not in salamander habitat, and will be less than 14.3 acres. On site material for dispersed recreation restoration treatments such as cut trees and slash may be used from and within salamander critical habitat, but existing salamander habitat features, such as rocks, downed logs, or soil will not be obtained from salamander critical habitat, nor will soil be brought into salamander critical habitat. Treatment sites are very small in scale, and may involve temporary disturbance of habitat on less than an acre, that will result in small scale improved habitat for the salamander by removing compaction of soil and recreational use.

Increase Water Sources for Wildlife

No earthen or trick tank will be constructed within salamander critical habitat. The Forest will consider construction of up to 5 earth tanks and 4 trick tanks throughout the project area outside of salamander critical habitat. Locations are unknown at this time. Due to the potential for spreading disease to salamanders, earth tanks will be assessed when the Forest determines the location to determine effects to salamander. If effects are likely, the Forest would initiate consultation on those actions. There is greatly reduced potential for spreading disease to salamanders or into salamander habitat with the construction of trick tanks (inverted umbrella rain/snow catchments); therefore, the Forest will look to construct up to 4 within the project area.

Construction of trick tanks would result in about 0.2 acres of ground disturbance each. This

would be as a result of digging down to set the tank about 1-2 feet into the ground and trenching a water line to the drinker box. This work would be done using a small tractor with backhoe and work would be conducted when the soils are dry to minimize effects to surface active salamanders. The tractor will be driven to the site from a road and back. We anticipate this to be on average one mile one way. Since these tractors are relatively small and the ground will be dry, we do not anticipate any measurable soil compaction or measurable effects to the salamander.

Cultural Site Protection

There are approximately 3,000 sites in the project area. Trees and brush will be removed from sites by hand and the material left nearby to be treated with the rest of the material in the stand. Sites on the National Historic Register and those eligible for the register will have priority for treatment. While the number and location of cultural site protection within designated critical habitat have not been identified, information from discussions with Forest archeologists indicated that overlap of the two is minimal. The Forest has already identified 21 sites and approximately 12 may receive site-specific treatment, although we note that approximately 60 percent of the project area remains unsurveyed for cultural resources. Based on the proportion of known sites in the area that has been surveyed and remaining unsurveyed area, the Forest estimates that an additional 50 sites may be identified and about 30 would be treated within salamander critical habitat. With an average of 0.5 acres per site, it is estimated that approximately 15 acres will be treated for cultural site protection in designated critical habitat. Seasonal restrictions will be followed for salamanders, and the size of any cultural site protection treatments is anticipated to be small in scale with temporary impacts from the relocation of woody debris.

Road Maintenance

Approximately 56 miles of road maintenance will occur in critical habitat. We estimate an average road width of about 20 feet with 3 feet on both sides for the road shoulder and ditch where maintenance would have the potential to affect the salamander. It is assumed that the compacted road surface is not currently suitable habitat for the salamander. Therefore, about 41 acres of marginal habitat along the road edges may be affected by road maintenance within salamander critical habitat. Level 4 roads (paved) and level 3 roads (graveled) are regularly maintained and are unlikely to support salamander habitat along the road edges. Examples of level 4 and level 3 roads include State Highway 4 or Forest Road 376 along the Rio Cebolla on the western edge of the project area. Level 3 and 4 roads may provide marginal salamander habitat along the road margins. The road surface is not salamander habitat and will not support salamander through any of their life stages.

Road maintenance outside of salamander critical habitat is expected to occur on approximately 350 miles of roads throughout the project. The Forest has estimated that approximately 2% these roads are in potential salamander habitat, and have calculated that approximately 5 acres of potential salamander habitat will be affected by road maintenance.

Salamanders may use habitat features along roadsides; however, the immediate shoulders of roads are not high quality salamander habitat. It is unlikely that salamanders will be affected by the maintenance of Level 3 or Level 4 roads since there is no usable habitat in the road or the shoulders. Salamanders may use rocks, logs, and other habitat features if present adjacent to unsurfaced or primitive roads; however, the Forest does not anticipate expanding road widths. Still, maintenance activities may disturb some habitat features on road sides over approximately 41 acres in designated critical habitat and 5 acres in potential salamander habitat.

Opening existing closed roads or new temporary roads

No temporary roads will be constructed in salamander critical habitat and approximately 2 miles of new temporary roads will be created in potential salamander habitat. The 56 miles (41 acres) of roads that will be maintained in critical habitat and the 350 miles (5 acres) in potential salamander habitat (above) include roads that are currently closed and will be opened to implement the project. The closed roads may have been naturalized to some extent (e.g. fallen trees and rocks across the road surface), but these roads were not decommissioned and still display an obvious road surface that is compacted from historic use. No additional effects to the salamander or its habitat beyond those associated with maintenance are anticipated from opening these existing roads.

Road Decommissioning Treatments

Approximately 6 miles of roads will be decommissioned in salamander critical habitat and 3 miles in potential habitat. The compacted road surface is not usable salamander habitat; therefore, it is estimated that approximately 4.4 acres (6 feet x 6 miles) on the sides of the roads may be temporarily disturbed in critical habitat and 2 acres in potential habitat. This is anticipated to be an overestimation of potential disturbance since the type of action needed to decommission a road varies from simple gating or blocking at the road junction to full recontouring. The Forest does not anticipate a large amount of recontouring due to the costs but will assess the specific action necessary based on site conditions.

Approximately 100 miles of roads (72.7 acres) acres may be decommissioned outside of salamander critical habitat in the project area. This is also anticipated to be an overestimation of potential disturbance since the type of action needed to decommission a road varies as described above. The Forest does not anticipate a large amount of recontouring due to the costs but will assess the specific action necessary based on site conditions.

Within salamander critical habitat, direct effects to the salamander could result in temporary disturbance of road edges where salamanders may occupy areas next to the road. The road surface is already disturbed and compacted and is not suitable habitat for the salamander. It is not anticipated that road decommissioning will affect canopy cover or logs (e.g. specific PCEs) but may affect rock cover objects used by salamanders. Road decommissioning will likely provide long-term benefits for the salamander as road surfaces naturalize and develop soil structure used by salamanders and above ground fragmented habitat is reconnected.

Gravel Pits

Gravel pit sites have not been identified and would not be known until it can be determined if the site(s) contain suitable material for road surfaces. Future gravel pits will not located in critical habitat or suitable salamander habitat. Before gravel pits are established, sites will be assessed for potential salamander habitat and surveyed at the appropriate time of year and climate conditions to determine suitability or occupancy. No additional effects to salamander or salamander critical habitat are anticipated.

Effects associated with Mechanical Treatments

The Forest describes the "most likely to be used" techniques for mechanical treatments as follows. Mechanical harvesting in the Jemez Mountains typically uses a boomed feller-buncher to cut and bunch timber and a rubber-tired skidder to remove cut trees from the stump and skid (drag) them to a roadside landing area for processing and loading. Feller-bunchers often have a boom reach of approximately 25 feet from the center point of the machine rotation. This enables the machine to cut multiple trees while the machine remains stationary and reaches out to individual trees with its boom and attached cutting head. Cut timber is then placed into bunches to facilitate efficient skidding. Feller-bunchers typically have 2 tracks with a combined width of approximately 56 inches. The machine makes a pass through the cutting unit approximately every 35 feet; this can vary as a result of topography and other factors. Ground pressure exerted by a John Deere 759 tracked feller-buncher is approximate 8 pounds per square inch (PSI).

Using these estimates approximately 13% of the stand would be have a onetime pass of a feller-buncher over it with a ground pressure of approximately 8 PSI. After the trees are cut and bunched, a rubber-tired grapple skidder backs up to, or drives alongside the bunched trees. The grapple closes around the logs and lifts them so that the butt end of the tree is free of the ground and only the tops drag behind the machine. Ground PSI for rubber tired skidders can vary, but for a John Deere 648 it is approximately 13 PSI. Skidders cover a greater percentage of the area than a feller-buncher, and will make multiple passes over some of the trails. A rough estimate of trails coverage is 15% of the area receiving more than one pass, and another 10% of the area that receives only a single pass with a skidder. These percentages may vary between operations.

The processor is at the landing. It removes branches, cuts the logs to desired length, and piles them in a deck, or loads them directly onto a truck. A TimberPro 725 processor has a PSI of 6.4. The skidder then takes slash (tops and branches) back to woods on its return trip, laying the slash on the skid trail. Then the skidder drives on top of a layer of slash, which distributes weight, protects the soil, incorporates organic material into the soil, and reduces soil compaction. Additional slash can be piled and burned, or scattered in the woods, depending on ecological and fire objectives.

The logging truck is usually self-loading; it takes logs from the deck and loads them onto the truck, which drives on existing system roads out of the woods.

Summary of Critical Habitat Affected

- Feller-buncher - 13% of the area with a one-time pass of 8 PSI
- Skidder- 10% of the area with a one-time pass of 13 PSI
- Skidder- 15% of the area with up to three of 13 PSI
- Skidder- additional passes to return slash, PSI reduced because slash is laid ahead of machinery.
- Processor- moves along road with 6.4 PSI
- Logging Trucks- stay on existing road beds

In total, there are approximately 2,877 acres in designated critical habitat that will receive mechanical treatments. Using the estimates of percentage of area impacted by heavy machinery provided by the Forest, we calculate that 374 acres will experience a one-time pass of with 8PSI of pressure; 288 acres will experience a one-time pass with 13 PSI of pressure; and 431 acres will experience up to 3 passes with 13 PSI of pressure. The 431 acres with multiple passes is expected to have the greatest amount of compaction due to multiple passes. The Forest will attempt to limit to no more than three passes over any areas, as the Forest reports greater, significant soil compaction can occur after three passes. In total, approximately1,151 acres will be impacted through compaction of heavy equipment from the feller-buncher and skidders. An additional approximately 38 acres will be compacted through the creation and use of landings (152 landings at an average of 0.25 acres per landing). The Forest reports that they do not know how these pressures will impact soils of the Jemez Mountains, and therefore, are not able to assess impacts to salamander habitat, specifically, primary constituent element (4) Underground habitat in forest or meadow areas containing interstitial spaces provided by: (a) Igneous rock with fractures or loose rocky soils; (b) Rotted tree root channels; or (c) Burrows of rodents or large invertebrates. Furthermore, it is unknown whether compaction could further fragmentation or reduce connectivity of salamander populations. However, the Forest will limit landings in salamander critical habitat to 0.25 acres, which will disperse impacts, and minimize potential fragmentation.

Interrelated and Interdependent Activities Associated with the Proposed Action

In the Forest Service response to information dated March 27, 2015, it is stated that the mechanisms for which biomass will be handled from treatments is not known, because the Forest will ask bidders for the contract to determine how they will dispose of the biomass, but a likely scenario is described. The likely scenario is that trees larger than 12 inches dbh would be hauled away on log trucks. Trees 5-12 inches dbh might be a) piled next to a road, for firewood for the public, or b) hauled away, or c) chipped on site into a truck and hauled away. Trees smaller than 5 inches dbh and tops and limbs of larger trees would be jackpot piled (loose piles with some scattered slash in between). The area would then be burned in a manner to consume the needles, twigs, and most of the piles, but leave some wood scattered around the site. Mastication may be used in few places, like next to houses, where burning is not feasible or adjacent to fire lines to reduce ladder fuels.

Burning of jackpot slash piles in critical habitat will be conducted during a time when burning

conditions (environmental prescription,) will not be conducive to sustained surface fire spread. This will be a pile burn not a broadcast burn. Burning under these conditions will help ensure that existing large down woody debris and duff layer will not be consumed by fire. For example, burning during dry intervals between monsoonal storms when fuels adjacent to the jackpots will not burn. Under these conditions, large logs and debris will not ignite, also duff and soil would be wet and not consume. Burning will target the needles and small branches within the jackpot piles. Burning under these conditions will reduce the hazard and will reduce impacts the salamander or its habitat. The larger diameter (>3") activity fuel within the jackpots of slash will have higher fuel moisture and will not fully consume under the environmental prescription of jackpot burning. This will leave much of the larger coarse woody debris present after jackpot burning.

Mastication will be used minimally to reduce ladder fuels adjacent to fire line for implementation of prescribed fire, or in small areas next to structures. The typical width for masticated material for the purpose of reducing ladder fuels adjacent to fire lines (from fire line to interior of burn unit) is approximately 1 chain or 66 feet from the fire lines. Mastication will not be the primary tool to reduce ladder fuels but the Forest estimates that over the 10 years of project implementation, approximately 80 acres in designated critical habitat (10 miles of masticated material 66 feet wide) could be used for fuel reduction adjacent to fire lines within salamander critical habitat. This is anticipated to be an overestimation of the area where mastication may be used and mastication will not occur on all parts of this area as not all logs will be masticated. The intent of this treatment is to reduce flame lengths so control lines will prevent the spread of fire outside of the prescribed burn area. For areas outside of critical habitat, the Forest estimates that less than 400 acres (50 miles of masticated material) over 10 years will be masticated throughout the project, and less 100 acres of potential salamander habitat would be masticated. Due to the limited application and the timing restrictions for use of heavy equipment, direct effects to salamanders will be minimized or avoided. Effects from mastication are expected to primarily affect habitat from the destruction of down logs adjacent to containment lines. Average depths of masticated material is not anticipated to exceed 2 inches with a range of 0-4 inches. Thick layers of masticated material may be an impediment to salamander movement, but masticated material will be patchy and anticipated levels of material are not anticipated to reach uniformity and depths that could impede salamander movement. Much of the area masticated will still have light slash and open areas.

Within the first year of project implementation, approximately 5 miles (1.85 acres) of new fire line will be constructed in potential salamander habitat and none within designated critical habitat. Over the duration of the project, it is anticipated that up to 10 miles (3.7 acres) of new fire line will constructed in designated critical habitat in any single year, or over the course of the project. An additional 5 miles (1.85 acres) per year for the next 10 years (50 miles; 18.5 acres) may be constructed in potential salamander habitat. Fire line will be rehabilitated that may include returning the ground to natural contours, implementing decompaction and erosion control measures as needed, pulling slash and rocks across fire lines, disguising entrances, and covering bare soil with slash, chips, needles, or cut brush as necessary, and reseeding with native

seeds as needed. Any rehabilitation that disturbs the soil, rocks, woody debris, or potential cover objects in designated critical habitat for the salamander or in potential salamander habitat will occur when conditions are dry or frozen, or outside of the surface activity season for the salamander. New fire line will temporarily disturb habitat, making the above ground habitat in the footprint of the firelines unusable and potentially fragmenting above ground habitat, that may limit movement of salamanders. The temporary impacts are expected to be from the time fire lines are construction until they are rehabilitated. How the firelines are rehabilitated may influence how quickly salamanders will be able to use those areas again, and the duration of potential fragmentation.

Effects of the action on PCEs in designated critical habitat

PCE: (A) Consists of the following tree species alone or in any combination: Douglas fir (*Pseudotsuga menziesii*); blue spruce (*Picea pungens*); Engelman spruce (*Picea engelmannii*); white fir (*Abies concolor*); limber pine (*Pinus flexilis*); Ponderosa pine (*Pinus ponderosa*); and aspen (*Populus tremuloides*); and (B) Has an understory that predominantly comprises: Rocky Mountain maple (*Acer glabrum*); New Mexico locust (*Robinia neomexicana*); oceanspray (*Holodiscus* spp.); or shrubby oaks (*Quercus* spp.)

Effect: We anticipate that overall this PCE will be enhanced with the implementation of the project, because Douglas fir, a tree species of relatively greater importance as a down woody debris habitat feature, will be targeted for retention as living trees, old growth stands, left down woody debris, and snags in salamander critical habitat, and tree species, such as white fir will be reduced from unnaturally high levels. Aspen treatments could affect this PCE by creating openings up to 2 acres on a total of 33 acres in critical habitat. It is anticipated that effects to this PCE from the aspen treatments will be temporary in nature as aspen sprouting should begin soon after treatment. Meadow treatments could affect this PCE by cutting trees on the perimeter of meadows where trees have encroached to the meadow on approximately 24 acres. These areas only became established with trees during relatively recent changes in fire regimes. Salamander habitat occurs in meadow with trees on the perimeter, which will still be the case after meadow treatments. Meadow treatments are not expected to significantly alter quality or use of the salamander habitat on those 24 acres.

PCE: Ground surface in forest areas with moderate to high volumes of large fallen trees and other woody debris, especially coniferous logs at least 10 inches (25 centimeters) in diameter, particularly Douglas fir, which are in contact with the soil in varying stages of decay from freshly fallen to nearly fully decomposed; or

Effect: Again, we anticipate that this PCE will be enhanced with the implementation of the project, because Douglas fir, a tree species of relatively greater importance as a down woody debris habitat feature, will be targeted for retention as living trees, old growth stands, left down woody debris, and snags in salamander critical habitat. Woody debris may be reduced in up to

80 acres of designated critical habitat from the mastication of ladder fuels along fire lines.

PCE: Structural features, such as rocks, bark, and moss mats that provide the species with food and cover.

Effect: We anticipate that this PCE will primarily be affected by the use of heavy machinery. A total of approximately 1,151 acres for skid trails and 38 acres for landings will be affected, where rocks, bark, moss mats and other structural features are disturbed or destroyed from the use of heavy equipment. An additional 4 acres the construction and rehabilitation of fire line and 41 acres may be temporarily disturbed with the maintenance of roads. The long-term effects of this disturbance from heavy machinery are unknown at this time. In addition, this PCE may be affected by burning, as structural features such as down woody debris, bark, and moss mats can be consumed during burning operations. While the effects from burning on these structural features are not are also not known, the Forest anticipates that less than 10% of the area burned will result in high intensity fire. Furthermore, the Forest is collecting general habitat elements that will be monitored before and after treatment implementation through fire effects monitoring plots. Data from this monitoring will be used to assess how these structural features may be affected by burning activities, and future BMPs can be developed and implemented if needed.

PCE: Underground habitat in forest or meadow areas containing interstitial spaces provided by: (A) igneous rock with fractures or loose rocky soils; (B) rotted tree root channels; or (C) burrows of rodents or large invertebrates.

Effect: In total, 1,189 acres (1,151 acres for skid trails and 38 acres for landings) of designated critical habitat will be impacted through compaction from heavy equipment use, with pressures ranging from 6.4 to 13 PSI. The Forest reports that they do not know how these pressures will impact soils of the Jemez Mountains, and therefore, are not able to assess impacts to salamander habitat, specifically, primary constituent element (4) Underground habitat in forest or meadow areas containing interstitial spaces provided by: (a) Igneous rock with fractures or loose rocky soils; (b) Rotted tree root channels; or (c) Burrows of rodents or large invertebrates. Approximately 152 new landings of approximately 0.25 acres in size each may be created in designated critical habitat for the salamander. Landing sites will be placed where old landing sites were once located when possible to minimize new areas of disturbance. Landings will have greater compaction than other areas resulting from continued use, and may reduce or eliminate primary constituent element (4) Underground habitat in forest or meadow areas containing interstitial spaces provided by: (a) Igneous rock with fractures or loose rocky soils; (b) Rotted tree root channels; or (c) Burrows of rodents or large invertebrates.

PCE: Moderate to high tree canopy cover, typically 50 to 100 percent canopy closure, that provides shade and maintains moisture and high relative humidity at the ground surface.

Effect: This PCE may be affected through thinning and removal of trees (approximately 2,861)

and the use of prescribed fire on an additional 11,165 acres in designated critical habitat. Ten percent of the 14,026 acres of critical habitat (1,403 acres) may experience high severity fire that could reduce canopy cover in patches, resulting is some patchy warming and drying across critical habitat. The proposed action will result in a reduction in overall canopy closure in a patchy distribution, with small openings as described in the proposed action. The moderate to high tree canopy cover, typically 50 to 100 percent canopy closure PCE reflects the role that tree canopy plays in maintaining moist and shaded microhabitat required by the salamander. While the interactions between aspect, canopy density, and distribution of size and numbers of open areas are complex, research conducted in the Jemez Mountains (Veatch et al. 2009; Gustafson et al. 2010) and in a global meta-analysis of 21 studies (Lundquist et al. 2013) indicate that strategically opening canopy gaps in forests can both optimize snow retention (and thus soil moisture in salamander habitat) and increase fire resiliency and landscape heterogeneity. While the proposed action will reduce this PCE, it is expected that the function of the PCE, to maintain cool, moist, humid microhabitat condition may be improved by the proposed action across the action area. In summary, this PCE will be altered such that small scale areas will have reductions in canopy closure that are less than moderate to high canopy closure, but, at a larger scale, it is expected that function of this PCE will be maintained or enhanced in designated critical habitat.

New Mexico Meadow Jumping Mouse

In riparian areas, recreation use (camping, fishing, vehicle use) and grazing have trampled riparian vegetation and streambanks. These bare areas along streams, headcuts (gullies), and eroded streambanks add sediment to streams. As a result, vegetation needed by riparian-dependent species, such as the jumping mouse, is limited. Some riparian corridors do not have enough willow, aspen, or other vegetation to sustain beaver populations. The proposed treatments to enhance riparian habitat, seeps and springs, and instream aquatic habitat would greatly improve and restore jumping mouse habitat along San Antonio Creek and Rio Cebolla, where treatments would occur. Currently, stream channels lack connectivity to their floodplain at many locations and this limits water retention and dense, herbaceous riparian vegetation in streamside areas. The improvement of habitat quality and connectivity in riparian areas would be beneficial overall to the jumping mouse; however, as analyzed below, we anticipate some short-term adverse impacts to habitat.

Proposed treatments to improve the overall condition of jumping mouse habitat include exclosures (designed to prevent grazing from elk and livestock) and mechanical treatments to stop down-cutting of stream channels and raise ground water to restore wetland vegetation. This would benefit herbaceous vegetation that is currently limited or absent within many of the riparian areas planned for treatment. The channel restoration treatments will receive riparian tree plantings or sedge seeding as appropriate for bank stabilization and restoration of jumping mouse habitat. These actions would promote the expansion of suitable jumping mouse habitat within stream reaches that contain populations found since 2005, which should augment the current size

and connectivity of suitable jumping mouse habitat and increase the distribution of the species in the Jemez Mountains to increase population redundancy and resiliency. The proposed action should improve riparian vegetation and stream function, resulting in less erosion and revegetating areas of bare soil and stabilizing streambanks. Although we anticipate some short-term adverse effects to small areas of suitable habitat as a consequence of the restoration actions, particularly mechanical treatments using heavy machinery that would crush or eliminate some areas of riparian vegetation, overall long-term restoration of these areas is expected to offset any temporary impacts. The Forest Service will minimize impacts within occupied jumping mouse habitat by conducting mechanical treatments during times when soils are dry or during the inactive period when the species is hibernating below ground in upland areas. The measures will ensure that mechanical treatments will not be conducted within riparian areas when jumping mice are present.

Exclosure fencing would also be used along sections of the San Antonio and the Rio Cebolla to protect aquatic structures and riparian vegetation. The exclosures would not be continuous over the 5-miles and each fenced reach will have an adjacent un-fenced reach providing livestock access to water. We anticipate the construction of fences will result in insignificant or discountable impacts to jumping mouse habitat.

The use of heavy equipment to repair headcuts and recontour areas is expected to have short-term adverse effects (e.g., crushing, altering, or destroying) on herbaceous vegetation. Headcuts that are not accessible using existing roads or that are on erosive soils will be treated when soils are dry or frozen soil, which would limit impacts because jumping mice would be hibernating underground during frozen conditions and would not be found in areas with dry soils. The greatest amount of sediment inputs will come from a tractor being used in or near the stream or crossing the stream. Nevertheless, silt fence and straw waddles will be deployed if needed to prevent soil erosion and disturbance in these areas. Although some adverse effects to jumping mouse habitat are anticipated, these actions combined with exclosures will improve habitat conditions long-term for the jumping mouse.

The restoration of riparian habitat that has been impacted by dispersed recreation will occur mostly within stream corridors. Dispersed recreational sites that are determined to have adverse effects to riparian vegetation will be obliterated by scarifying compacted soils, seeding vegetation, and placing rock and downed wood to prevent future use. Because many of these impacted sites lack suitable jumping mouse habitat, we do not anticipate the areas to be currently occupied by the jumping mouse. Areas with heavy soil compaction will be ripped and seeded with native vegetation. Most of the work would be done by hand, though large equipment might be used to place rock and downed wood. The use of vehicles and other equipment to rehabilitate dispersed campsites would disturb soil and damage riparian vegetation along the stream corridors. These effects to small areas of fragmented habitat are anticipated to be short-term, with treated areas expected to recover within one year. The Forest Service would also plant herbaceous vegetation and woody species that minimize the initial impacts caused by treatments

and speed recovery of jumping mouse habitat. Rehabilitated sites may also have exclosures built to protect newly planted vegetation. Exclosures are expected to be removed between 7-10 years following their installation when riparian vegetation is restored.

Re-channelization using a plug and pond is a restoration technique for improving aquatic and riparian habitat. This technique raises the ground water along stream channels where down cutting has occurred. Heavy equipment will be used to dam the existing channel at a location that moves the flow of the creek into a higher elevation historic channel mimicking the effects of beaver ponds. Similar to beaver ponds, this action would start the process of sediment trapping in that stretch of the stream, resulting in higher ground water and promoting riparian vegetation. This technique would only be used where the stream gradient and width of the valley is conducive to success. To date, two locations have been identified that may be suitable for plug and pond restoration, one on the San Antonio and one on the Rio Cebolla. The San Antonio location would be in an area that does not contain suitable habitat and is not occupied by the jumping mouse, whereas the Rio Cebolla will likely be located within in an area that contains suitable habitat and is considered to be occupied by the species. The Forest Service will coordinate site selection of these actions with the USFWS to ensure that activities will avoid any impacts to the jumping mouse. Conservation measures will include either avoidance of occupied jumping mouse habitat during the active season or conducting treatments within areas that are considered unoccupied. These actions would alter about 600 feet of stream and may pond or saturate soils over 4 to 5 acres upstream of the plug. Re-channeled reaches will be fenced around both the new and old channel and native riparian planting. These measures will minimize adverse effects by providing protection from grazing and stabilizing the stream bank.

All of these actions may remove riparian vegetation or heavy machinery may flatten vegetation at a site, which would result in short-term adverse impacts to jumping mouse habitat. Heavy equipment and recontouring of areas may also disturb the ground and compact soils in riparian areas. Because the treatments will occur when the soils are frozen or dry, the jumping mouse would be hibernating and inactive (between mid-October and mid-May) or not be expected to occur in areas the lack saturated soils. The Forest Service will coordinate actions with the USFWS to select heavy machinery access to the treatment areas, which will minimize disturbance of possible hibernation sites. We do not expect direct effects to injure or kill any hibernating individuals due to crushing by heavy equipment because jumping mice will be below ground. Hibernation sites are likely below ground and associated with the base of shrubs and trees or woody debris. For example, hibernation sites for Preble's meadow jumping mouse were located within 100 m (328 ft) of the 100-year flood plain of the main stream and were about 30 cm (12 in) deep (Schorr 2001; Bain and Shenk 2002). At the Air Force Academy in Colorado, six Preble's meadow jumping mice hibernacula were located an average distance of 22 m (72 ft; range 7 to 31 m (23 to 102 ft)) from the associated creeks at the base of willow (*Salix exigua* and *S. fragilis*) and Gambel oak (*Quercus gambelli*) trees (Schorr 2001). For these reasons, direct and indirect effects of re-channelization are anticipated to be insignificant and discountable.

Upland activities such as thinning, harvesting, prescribed burning, treatments to manage for old growth, cutting conifer trees encroaching on riparian habitat, and treatment for pinon-juniper will likely have insignificant or discountable effects to the jumping mouse and its habitat. All of these upland activities, except cutting conifer trees encroaching on riparian habitat, would not take place in jumping mouse habitat. Consequently, these treatments will likely assist in protecting jumping mouse habitat from the adverse effects from severe post-wildfire ash flow and flooding.

Prescribed burning in jumping mouse habitat would be incidental and associated with burning of upland conifer forests. Although there would be no attempt to light riparian areas, prescribed burning would likely result in portions of some riparian areas being burned. This action would likely happen when jumping mice are anticipated to be in hibernation or during the active period of the jumping mouse when riparian vegetation would be green and unlikely to burn hot. After a prescribed fire is complete, the area would be rested from livestock grazing for a period of 1-2 years, minimizing cumulative effects to jumping mouse habitat. This rest period is needed to let the soil stabilize and for grasses and forbs to reestablish and grow. Riparian areas are generally adapted to minor pulses of sediment and ash in stormwater runoff after low-severity fires. Riparian areas are expected to respond positively to low-severity prescribed fire as a result of increases in available water and nutrients. The sediment and ash provide nutrients that support riparian vegetation. Alternatively, prescribed fire that burns with a high intensity (hotter) could damage the soil, especially in some areas where there is more fuel. Protective measures proposed by the Forest Service include a lighting pattern that allows fire to back down into riparian areas would minimize soil damage and adverse effects. Effects to hibernating jumping mice from prescribed burning are unknown, but it is assumed that jumping mice would be underground where they would be protected. For these reasons, we do not expect prescribed burning will result in adverse effects to the jumping mouse. Additionally, we anticipated only insignificant or discountable impacts to the PCEs of jumping mouse critical habitat from prescribed fire because we expect a mosaic of light burning to occur with most of the vegetation unaffected..

Project specific forest plan amendments will have no effect on the jumping mouse because these only pertain to woodland or cliff dwelling species (e.g. Peregrine falcon) or changes in management for visual quality. Therefore, they will not affect the jumping mouse or its critical habitat.

Proposed Critical Habitat

Table 12 depicts the acres or number of potential treatments within proposed critical habitat for the jumping mouse. Treatments to regenerate aspen within jumping mouse habitat would be determined based on the condition of the aspen stand and the potential effects to jumping mouse. Aspen regeneration will likely result from prescribed burning, but some areas exist where conifer

has outcompeted aspen and cutting conifer trees within aspen stands may be used to promote aspen regeneration.

Table 12. Potential acres of treatments within New Mexico Meadow Jumping Mouse Critical Habitat.

Treatment	Acres
Aspen	150
Riparian	269
Meadow	129
Invasive Species	11
Headcuts	129
Recreation Sites (number)	9
Road Decommissioning (miles)	3
Harvest	37
Prescribed Burning	687

Riparian treatments such as exclosures would be constructed to protect aquatic structures from ungulate damage and promote native riparian vegetation. This may include exclosures built around headcut treatments and restoration of recreation sites. Riparian treatments may also include rechanneling using the plug and pond technique to restore the ground water table and promote restoration of riparian vegetation. All of these techniques will assist in the restoration of tall, dense herbaceous riparian vegetation, but may also result in short-term impacts to this PCE.

Invasive species would be mechanically removed, either by hand or with heavy equipment, where appropriate. If heavy equipment is needed to remove invasives, the Forest Service will coordinate with the USFWS to avoid any impacts to the jumping mouse. Herbicides would not be used unless the Forest completes an analysis for use of herbicides and consultation with the USFWS.

Road decommissioning may affect riparian habitat adjacent to the road, but would likely improve jumping mouse habitat long-term by reducing human disturbance and restoring flood plain function and condition, promoting riparian vegetation communities. Road decommissioning may result in 0.3 acre of disturbance to the PCE of tall, dense herbaceous riparian vegetation, but these impacts will likely spread throughout the project area where roads bisect critical habitat.

Treatment and restoration of dispersed recreational would be conducted in small areas of proposed critical habitat and likely cause short-term (1 growing season) adverse impacts to the PCE of tall, dense herbaceous riparian vegetation, but would be beneficial to jumping mouse critical habitat in the long-term. Some of the work would be done by hand, although heavy machinery might be used to place rock and downed wood in disturbed or rehabilitated areas.

Timber harvesting would likely take place in areas where jumping mouse critical habitat overlaps upland coniferous forest types or where conifers have encroached into riparian vegetation. These proposed treatments would be conducted in transition zones between the flood plain and the mountain slopes comprised of grasses in wider valley types where wildfire historically kept conifer trees to the slopes. There is no intent to remove native riparian vegetation in the project area. The BMPs would protect riparian vegetation from impacts associated with heavy equipment used in harvesting activities. Throughout the project area, filter strips will be designated on all perennial, intermittent, and ephemeral streams where mechanical equipment for timber harvest will not be allowed to operate and fuels will not be ignited in those areas. This will limit impacts to the PCEs of critical habitat.

Prescribed burning in jumping mouse critical habitat would be incidental and associated with prescribed burning of the upland conifer forests. Riparian vegetation may experience some burning, although there would be no attempt to ignite riparian vegetation within critical habitat and riparian vegetation would likely be too green to burn well at the time when prescribed burning would take place. There may be some short-term insignificant or discountable impacts to the PCEs of jumping mouse critical habitat from prescribed fire because we expect a mosaic of light burning to occur with most of the vegetation unaffected.

In many areas, the PCEs that include forbs and herbaceous riparian vegetation needed to support habitat for the jumping mouse are limited or absent. Proposed treatments to enhance riparian areas, the instream habitat work, and exclosures would improve jumping mouse critical habitat. Riparian and channel restoration may result in short-term impacts to jumping mouse critical habitat by disturbing riparian areas with herbaceous and woody riparian vegetation. Still, treatments would likely move the PCEs of jumping mouse critical habitat toward a desired condition and function for the species' recovery in San Antonio and Rio Cebolla. Nevertheless, we anticipate temporary effects to PCEs of jumping mouse critical habitat from the use of heavy equipment within riparian areas to install aquatic structures and construction of protective fencing. PCEs (dense, herbaceous riparian vegetation) may also be altered during road decommissioning though these short-term adverse effects will likely lead to long-term benefits in protecting and restoring critical habitat.

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. 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.

Climate change, in combination with drought cycles, is likely to exacerbate existing threats to all these species' habitats in the Southwestern U.S., now and into the foreseeable future. Increased and prolonged drought associated with changing climatic patterns will adversely affect streams

and riparian habitat by reducing water availability and altering food availability and predation rates. The continued warming and drying of forested habitats will likely alter vegetation structure and composition and reduce the amount and quality of nesting and roosting habitat for Mexican spotted owls in the action area. However, implementation of forest restoration projects such as the Southwest Jemez Mountains Restoration Project should help to mitigate some of the long-term effects of climate change on Mexican spotted owl habitat.

The main non-Federal activities that may impact the Mexican spotted owl habitat are loss of habitat through development of private inholdings for home sites and related disturbance at these properties. Within these private lands, there is the potential for activities that create disturbance or removal of Mexican spotted owl habitat components on private lands, such as roads, grazing, mining, recreation activities, and fuel treatments. Mexican spotted owl critical habitat has not been designated on non-Federal lands; there are no anticipated cumulative effects to Mexican spotted owl critical habitat from non-Federal actions.

The on-going activities in subdivisions, roads, mining, and recreation, may increase disturbance and influence quality and quantity of nesting and foraging habitat on State and private land. Ongoing grazing on private lands would continue to effect jumping mice and critical habitat.

We also anticipate that jumping mouse habitat will be negatively affected by climate change occurring now and into the future, which may amplify the lack of available water within streams and springs resulting from lower precipitation trends and drought (see also SSA Report; USFWS 2014). For example, increased and prolonged drought associated with changing climatic patterns are likely to adversely affect jumping mouse habitats by reducing water availability and potentially shrinking the amount of herbaceous riparian vegetation as water recedes. However, we lack sufficient certainty to accurately predict how climate change will ultimately affect jumping mouse populations.

CONCLUSION

Jeopardize the continued existence of, is defined as, to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

Recovery calls for improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act (50 CFR § 402.02).

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of 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. [1]

Mexican spotted owl and critical habitat

After reviewing the current status of the Mexican spotted owl and its critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that implementation of the Southwest Jemez Mountains Restoration Project will not jeopardize the continued existence of the Mexican spotted owl, and will not destroy or adversely modify its designated critical habitat. We base our conclusion on the following:

1. The project will strive to implement the Recovery Plan (USDI FWS 2012) and manage for Mexican spotted owl recovery on the Santa Fe National Forest.
2. Desired conditions and guidelines in the project recognize the need to reduce the potential for landscape level, stand-replacing fire in mixed conifer forests that the Mexican spotted owl occupies. These efforts to improve forest condition and sustainability should reduce the risk of high severity fire and subsequently, reduce the loss of owl habitat.
3. Based on the discussion provided in the Effects to Mexican Spotted Owl Critical Habitat section above, the CHU affected by the project will continue to serve the function and conservation role of critical habitat for the Mexican spotted owl.

[1]December 27, 2004, memo from Acting Director Fish and Wildlife Service. This analysis is also consistent with our proposed definition of "destruction or adverse modification of critical habitat" published in the Federal Register on May 12, 2014 (79 FR 27060).

Jemez Mountains Salamander

After reviewing the current status of the Jemez Mountains salamander and its critical habitat, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that implementation of the Southwest Jemez Mountains Restoration Project will not jeopardize the continued existence of the Jemez Mountains salamander, and will not destroy or adversely modify its designated critical habitat. We base our conclusion on the following:

1. The Forest will continue to work with the Service to identify BMPs and Conservation Measures that can be incorporated into the proposed action and will manage for the recovery Jemez Mountains salamanders on the Santa Fe National Forest.
2. Activities in salamander critical habitat will occur when soil conditions are dry or frozen and outside of the surface active season of the salamander (June 15 through October 30), or will incorporate measures to avoid impacting the species, unless otherwise agreed upon and documented between the Forest and USFWS.

3. Desired conditions and guidelines in the project recognize the need to reduce the potential for landscape level, stand-replacing fire in mixed conifer and ponderosa pine forests that the Jemez Mountains salamander occupies. These efforts to improve forest condition and sustainability should reduce the risk of high severity fire and subsequently, reduce the loss of large scale salamander habitat.

New Mexico meadow jumping mouse and critical habitat

After reviewing the current status of the New Mexico meadow jumping mouse, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the USFWS's Biological Opinion that the project, as proposed, is not likely to jeopardize the continued existence of the endangered New Mexico meadow jumping mouse. We also find that the effects are not likely to destroy or adversely modify proposed critical habitat. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of the jumping mouse. We make these findings for the following reasons:

1. We anticipate the small amount of low to moderate quality jumping mouse habitat and PCEs that will be impacted by the proposed action.

2. The activities will occur outside of the active season of the jumping mouse or will incorporate measures to avoid impacting the species.

3. We do not anticipate any direct or indirect effects to jumping mice during project implementation.

4. The specific treatment areas are likely used occasionally by the species, and reproduction, numbers, and distribution of the species are unlikely to be affected by temporary impact to riparian habitat and PCEs.

We do not believe the likelihood of survival and recovery of the jumping mouse will be compromised due to the implementation of the proposed action because improved habitat quality and quantity are anticipated as the PCEs in riparian areas are revegetated and restored.

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

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take

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

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to an applicant/permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (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 Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement [see 50 CFR 402.14(i)(3)].

Amount of Take

Mexican Spotted Owl

For the purpose of evaluating incidental take of Mexican spotted owls from the action under consultation, incidental take can be anticipated as either the direct fatality of individual birds or the alteration of habitat that affects behavior (e.g., breeding or foraging) of birds only temporarily, or to such a degree that the birds are considered lost as viable members of the population and thus "taken." Birds experiencing only temporary or short-term effects may fail to breed, fail to successfully rear young, or raise less fit young; longer-term disturbance may result in owls deserting the area because of chronic disturbance or because habitat no longer meets the owl's needs.

We anticipate that the proposed action is reasonably certain to result in incidental take of Mexican spotted owls. However, it is difficult to quantify the number of individual owls potentially taken because: (1) dead or impaired individuals are difficult to find and losses may be masked by seasonal fluctuations in environmental conditions; (2) the status of the species could

change over time through immigration, emigration, and loss or creation of habitat; and (3) the species is secretive and we rarely have information regarding the number of owls occupying a PAC and/or their reproductive status. For these reasons, we will attribute incidental take at the PAC level. This fits well with our current section 7 consultation policy which provides for incidental take if an activity compromises the integrity of an occupied PAC to an extent that we are reasonably certain that incidental take occurred (USFWS 1996). Actions outside PACs will generally not result in incidental take because we are not reasonably certain that Mexican spotted owls are nesting and roosting in areas outside of PACs. We may modify this determination in cases when areas that may support spotted owls have not been adequately surveyed and we are reasonably certain spotted owls are present.

Based upon analyses of the effects of Forest Service projects within previous forest restoration BOs, we anticipate the majority of incidental take for actions implemented under the SW Jemez Restoration Project proposed action will be in the form of short-term harassment. Owls experiencing short-term harassment may fail to successfully rear young in one or more breeding seasons, but will not likely desert the area because of a short-term disturbance (Delaney et al. 1999); harassment is measured as owls taken associated with a specific number of PACs. Incidental take in the form of harm is also anticipated, albeit at a lesser amount than take from harassment and is measured as the number of owls taken. For this project harm would be the direct fatality of individual birds.

There are at least six PACs that could be affected by the project. All PACs will be mechanically thinned and prescribe burned. In addition, other actions associated with riparian, aspen, and meadow restoration will occur in PACs. This work will occur outside the breeding season but based upon the lack of information in the proposed action, it is unclear how habitat may be modified as a result of these other activities.

Using available information as summarized within this document, we have identified conditions of incidental take for the Mexican spotted owl associated with implementation of the Southwest Jemez Mountains Restoration Project. Based upon the potential for incidental take to occur as part of implementation of the project, we anticipate the following incidental take for the proposed action, which is in addition to previously authorized incidental take resulting from ongoing projects or projects that have yet to be implemented:

- We anticipate the take of one pair of Mexican spotted owls and/or associated eggs/juveniles in the form of harassment in up to two PACs due to a single (one breeding season) or short-term (one to three breeding seasons) disturbance (non-habitat altering action that disrupts or is likely to disrupt owl behavior within the PACs) or habitat alteration (e.g., short-term loss of key habitat components) associated with implementation of the proposed action. The disturbance and short-term habitat modification generated by activities associated with the project is likely to interrupt, impede, or disrupt normal behavior patterns to the point that breeding and feeding

activities are impacted over the course of one to three breeding seasons. Incidental take is exceeded if owls associated within an individual PAC are harassed over the course of more than three breeding seasons or if owls associated with more than two PACs are harassed in one year as a result of this project. This incidental take tiers to (is included within) the amount of take anticipated under the 2012 BO for the Santa Fe Land and Resource Management Plan.

- In addition, we anticipate the incidental take of one Mexican spotted owls in the form of harm and/or direct fatality due to vehicular collision over the life of the project. Following the discovery of a fatality, we will re-assess the project with the Forest Service and determine how to reduce future fatality. This incidental take is within the number of owls anticipated to be incidentally taken (harmed) under the 2012 BO for the Santa Fe National Forest Land and Resource Management Plan.

Jemez Mountains salamander

Incidental take of Jemez Mountains salamander is reasonably certain to occur as a result of implementation of the proposed action. We anticipate that in most cases, take as a result of the proposed action will be in the form harm or harassment of the Jemez Mountains salamander through effects that disturb or alter habitat from the implementation of the proposed action. We anticipate that most forms of harm or harassment will result from alterations of microsites within habitat (e.g. consumption of individual organic cover objects during burning, changes in the distribution of soil moisture or temperature, and areas of soil compaction). Some individuals may be injured or killed as a result of the implementation of the proposed action, but we anticipate this number to be small because most activities will occur when the salamander is below ground. There may be occasional individuals that are surface active when environmental conditions are generally not suitable for salamander surface activity, but the likelihood of those outlying active salamanders being present where an action is being implemented is low. Furthermore, activities that use heavy equipment to move soil and rocks in salamander habitat may inadvertently injure or crush salamanders that are underground or surface active. The Forest has listed a variety of Conservation Measures designed to minimize or avoid harming, harassing, injuring, or killing salamanders.

We anticipate that incidental take of Jemez Mountains salamander will be difficult to detect for the following reasons: the species has small body size and cryptic coloration, most actions (e.g., mechanical treatments) will take place on such a large scale that detection of a dead or injured individual will be extremely difficult, there is no means of equating one dead salamander (assuming one was found) to a number of dead salamanders not observed, and most take is expected to be in the form of harm or harassment resulting from effects related to short-term alterations in microhabitat. For these reasons, it is not reasonable to express the amount of anticipated take of in terms of the number of individuals. Moreover, we conclude there is a causal link between salamanders and suitable microhabitat conditions (e.g., decaying coniferous

logs (particularly Douglas fir logs), subsurface geology with loose rocky soil structure, and substrate moisture and temperature). When we designated critical habitat for the species, we determined that the entire critical habitat is considered occupied. While it is possible that salamanders may not be detected at the small scale of a survey (measured in meters), the entire designation is considered with the geographic area occupied by the species because of the similarity and continuous nature of the physical and biological features such as dense tree canopy cover, higher levels of ground moisture, many fallen logs, surface rocks and woody debris, and soil structure that allows the salamanders to travel below ground as well as above ground. This is due to the fact that the lands within the units are virtually all high-elevation forests growing on top of igneous geologic formation and associated soils located around the rim of a long extinct volcano. Because the entire designation is considered occupied by the salamander, we are using habitat as a surrogate setting a clear standard for determining when the extent of take has been exceeded.

Because this project will take place over the next 10 years, and one strategy that will be used to minimize take to the salamander from the proposed action includes meeting annually to design the location of treatments and actions over space and time, incidental take will be quantified based upon annual action plan, and annual habitat disturbance. Incidental take of habitat will not exceed 14,026 acres in salamander critical habitat 2,118 acres of potential habitat. This is for the life of this consultation, and any annual take shall not exceed 50% of the total project take (so single year of annual take shall exceed 7,013 acres of critical habitat and 1,059 acres of potential habitat). Additionally, while we are not providing a numerical estimate for incidental take of salamanders associated with the proposed action and we will be providing an annual extent of take in the form of habitat disturbance as a result of the implementing the proposed action, we will also assume that if any dead or impaired salamanders are found then take will have been exceeded. By setting a threshold of one salamander, and no more than 14,026 acres of critical habitat and 2,118 acres of potential habitat disturbance over the life of this consultation with no more than 7,013 of designated critical habitat disturbance and1,059 of potential habitat disturbance in a single year, we have set an incidental take limit that is measurable and indicates that the salamander is being impacted at a level where the actions causing the take may need to change. We conclude that the incidental take of Jemez Mountains salamander will be considered exceeded if one dead or impaired salamander is located, or if the annual amount or total amount of habitat disturbance is exceeded. If one impaired or dead salamander is found, or the annual or total take limit of habitat disturbance is exceeded, then as provided in 50 CFR Section 402.16, reinitiation of formal consultation would be required as the amount or extent of incidental take would be exceeded.

New Mexico meadow jumping mouse

Based on the best available information concerning the jumping mouse, the habitat needs of the species, the project description, and information furnished by the Forest Service, take is not reasonably certain to occur. We have assumed that jumping mice continue to be present within

the action area because intact, suitable habitat is available and the New Mexico meadow jumping mouse requires specialized habitat requirements to support its life-history needs. Nevertheless, much of the work will be conducted within areas that do not contain suitable habitat or the habitat is highly fragmented and disjunct. The species would not be found in areas that lack suitable habitat. Although we anticipate the use and ingress/egress of heavy machinery may temporarily remove or alter dense herbaceous riparian vegetation through recontouring areas or crushing or altering vegetation or soils, these activities will avoid impacts to areas that are believed to be occupied by the species.

We do not anticipate that the implementation of the proposed action is reasonably certain to result in incidental take of any New Mexico meadow jumping mouse because:

1. The activities will occur outside of the active season of the jumping mouse; or

2. The Forest Service will coordinate with the USFWS to incorporate measures that avoid direct or indirect impacts to the jumping mouse.

The conservation measures included in the proposed action are appropriate to minimize the take of the jumping mouse and additional reasonable and prudent measures and terms and conditions to reduce incidental take are not needed.

If, during the course of the action, this level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measure provided. The Forest Service must provide an explanation of the causes of the taking and review with the USFWS the need for possible modification of the reasonable and prudent measures.

EFFECT OF THE TAKE

In this BO, the USFWS determines that this level of anticipated take is not likely to result in jeopardy to the Mexican spotted owl. We have based this determination on the number of PACs with anticipated take from mechanical thinning and burning projects to be implemented under the project that could have short-term adverse effects, but long-term benefits to the Mexican spotted owl, and direct fatality that could occur from vehicular collisions.

Mexican Spotted Owl and Jemez Mountains Salamander

The USFWS believes the following reasonable and prudent measures are necessary and appropriate to minimize the effects of take of Mexican spotted owls and Jemez Mountains salamanders.

1. Minimize adverse effects to Mexican spotted owls and Jemez Mountains salamanders affected by the Southwest Jemez Mountains Restoration Project.

2. Minimize adverse effects to Mexican spotted owl and Jemez Mountains salamanders habitat affected by the Southwest Jemez Mountains Restoration Project.
3. Monitor the impacts of mechanical thinning, prescribed burning, and associated actions to the Mexican spotted owl and Jemez Mountains salamander affected by the Southwest Jemez Mountains Restoration Project.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures listed above and outline reporting/monitoring requirements. These terms and conditions are non-discretionary. The USFWS may approve deviation from these terms and conditions through site-specific project consultation. Examples warranting deviation from these terms and conditions may include, but are not limited to instances where site-specific conditions dictate that full compliance with the condition is not necessary to avoid incidental take; the Forest Service lacks discretionary authority to implement the condition; or, deviation from the condition is needed to meet the purpose and need of a project.

If, during the course of the action, this level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Forest Service must provide an explanation of the causes of the taking and review with the USFWS the need for possible modification of the reasonable and prudent measures.

Mexican spotted owl

The following terms and conditions will implement reasonable and prudent measure 1:

1.1 The Forest Service shall avoid activities within 0.25 mile of PACs during the breeding season (March 1 to August 31) that could result in disturbance to nesting owls. If the Forest Service determines through protocol surveys that spotted owls are not nesting the year of the proposed project or locates a nest and is able to buffer the breeding owls from noise throughout the breeding season, then this restriction would not apply. Other options include documenting topographic buffers in specific PACs or using noise tampering technology to reduce noise impacts.

1.2 Forest Service management activities within PACs and restricted habitat shall be coordinated and implemented to reduce potential disturbance to Mexican spotted owls. For example, where possible, thinning and/or burning activities associated with habitat adjacent to PACs will be coordinated with overall PAC thinning and/or burning activities in order to minimize the frequency and duration of operations within and immediately adjacent to these areas.

1.3 The Forest Service, in coordination with the USFWS, shall develop contingency plans in the event of new PACs being established or PAC boundary modifications due to owl movement or habitat changes. Flexibility shall be built into the project (including task orders) so that as owls move or new sites are located, project activities can be modified to accommodate these situations.

1.4 The Forest Service shall ensure that all contractors associated with thinning and burning activities, transportation of equipment and forest products, research, or restoration activities are briefed on the Mexican spotted owl, know to report sightings and to whom, avoid harassment of the owl, and are informed as to who to contact and what to do if a Mexican spotted owl is incidentally injured, killed, or found injured or dead on the Santa Fe National Forest. If an owl fatality is discovered, the USFWS Mexican spotted owl lead will be contacted as soon as possible.

1.5 Haul trucks will not exceed 25 miles per hour on Forest Service System Roads in the project area.

The following terms and conditions will implement reasonable and prudent measure 2:

2.1 The Forest Service shall coordinate management activities within PACs and restricted habitat in order to reduce effects to habitat from multiple entries that can disturb owls and result in adverse effects to habitat.

2.2 The Forest Service shall meet annually with the USFWS to discuss the upcoming year's thinning and burning plans in Mexican spotted owl habitat and review the past year's thinning and burning activities in owl habitats.

The following terms and conditions will implement reasonable and prudent measure 3:

3.1 The Forest Service shall monitor the effects of mechanical thinning and prescribed burning on owl occupancy and reproduction, and key habitat components (as defined in the Revised Mexican spotted owl Recovery Plan, table C.2) in all six PACs. Owl occupancy and reproductive data shall be collected for at least two years prior to treatment and two years post-treatment. Vegetation data should be collected pre-treatment and at defined intervals post-treatment. The specific plan development, selection of PACs, and monitoring framework, shall be developed in coordination with the USFWS (including the Mexican spotted owl lead) and Forest Service District Staff to ensure coordination with other projects and monitoring efforts. This monitoring plan shall be designed and implemented to evaluate the effects of thinning and prescribed fire on owl occupancy and reproduction, and retention of or movement toward desired habitat conditions within PACs.

3.2 The Forest Service shall monitor the impacts of incidental take resulting from implementation of the proposed action and report these findings to the USFWS. Incidental take monitoring shall include information such as when the project was implemented, whether the project was implemented as proposed and analyzed in this BO (including conservation measures and best management practices), breeding season(s) over which the project occurred, relevant owl survey information, and any other pertinent information about the project's effects on the species.

3.3 Annual reports will describe actions taken under this proposed action and impacts to the owl and its critical habitat. The annual report shall be sent to the New Mexico USFWS Ecological Services field office and the USFWS Mexican spotted owl species lead by March 1st of each year.

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

Jemez Mountains Salamander

The following terms and conditions will implement reasonable and prudent measure 1:

1.1 The Forest Service shall ensure that all contractors associated with thinning and burning activities, transportation of equipment and forest products, research, or restoration activities are briefed on the Jemez Mountains salamander, important habitat features to avoid when practicable, and are informed of the conditions salamanders are typically surface active (moist soil at about 12 degrees C or 54 degrees F), and who to contact and what to do if a Jemez Mountains salamander is observed or incidentally injured, killed, or found injured or dead on the Santa Fe National Forest. If a salamander injury or fatality is discovered, the USFWS Jemez Mountains salamander lead will be contacted as soon as possible.

1.2 When seeking an exemption to the salamander restriction period, June 15 through October 30, the Forest shall develop a methodology or protocol that will be used to assess site specific environmental conditions and criteria used for determining suitability for surface activity for conducting work in salamander critical habitat.

The coordination between the Forest and USFWS should be documented for the project record.

The following terms and conditions will implement reasonable and prudent measure 2:

2.1 The Forest shall demonstrate that treatments that affect Jemez Mountains salamander or its designated critical habitat will be implemented in a staged manner so that effects can be dispersed over time and space, learning can take place, and new information can be applied to future treatments to minimize adverse effects to those species and habitat. The staged implementation may be coordinated and documented with the USFWS at annual meetings, or presented as an entire detailed implementation schedule prior to project implementation.

2.2 The Forest shall apply soil and watershed health and function design features stated on page 298 of DEIS to salamander critical habitat to minimize affects to salamander PCEs.

2.3 The Forest shall limit aspen treatments to 2 acres size in designated critical habitat until the Forest is able to collect and present information regarding effects of the treatments on the salamander or its habitat. Subsequent to receiving this information, the Service may approve in writing conducting aspen treatments up to 10 acres in size in designated critical habitat.

2.4 Material (e.g. rocks, boulders, logs) used for any treatment such as instream habitat restoration, headcut, or stabilization treatments, and site closings will not be removed from designated critical habitat.

2.5 The Forest will assess soil compaction resulting from heavy machinery using the first two treatment blocks in designated critical habitat and determine affects to salamander PCEs. Soil compaction data should include soil type or types, pre-treatment compaction data, equipment type used and, and relevant environmental or biophysical parameters present during treatment. The Forest shall report to the USFWS findings of compaction assessment in salamander critical habitat and any potential mitigations or BMPs that are developed to reduce effects of compaction.

2.6 The Forest shall develop BMPs, or work with the Service to develop BMPs, on how to best rehabilitate areas that have been impacted by new fire lines in designated critical habitat. Development of BMPs and rehabilitation of new fire lines shall occur within one year burn.

2.7 The Forest will use the data collected from the before and after treatment implementation fire effects monitoring plots to better understand how structural habitat features such as woody debris may be affected by burning activities. Results will be assessed and reported, with any potential BMPs or mitigation that may be developed within one year of collection to the USFWS.

2.8 The Forest will continue to work with the USFWS to develop additional BMPs to minimize impacts to the salamander, its designated critical habitat, and potential critical habitat.

2.9 Heavy machinery or other equipment used for treatments to restore instream habitat or used in aquatic systems will be cleaned of all soil, mud, and debris followed by disinfection with approved chemicals prior to moving equipment into undisturbed areas (e.g. outside of existing road beds) occupied or potentially occupied by salamanders to minimize the risk of spreading or introducing amphibian pathogens.

2.10 The Forest Service shall meet annually with the USFWS to discuss the upcoming year's implementation schedule for the proposed action, including thinning and burning plans in Jemez Mountains salamander critical habitat and potential habitat and review the past year's thinning and burning activities in salamander habitat and review the development of an occupancy model or other scientifically sound equivalent

The following terms and conditions will implement reasonable and prudent measure 3:

3.1 The Forest Service shall monitor the impacts of incidental take resulting from implementation of the proposed action and report these findings to the USFWS. Incidental take monitoring shall include information such as when the project was implemented, whether the project was implemented as proposed and analyzed in this BO (including conservation measures and best management practices), acreages of habitat affected and how, salamander survey information, and any other pertinent information about the project's effects on the species or its habitat.

3.2 Annual reports will describe actions taken under this proposed action and impacts to the salamander and its critical habitat. The annual report shall be sent to the New Mexico USFWS Ecological Services field office by March 1st of each year.

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

of the taking and review with the New Mexico Ecological Services Office the need for possible modification of the reasonable and prudent measures.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the USFWS's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 505-248-7889) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care and in handling dead specimens to preserve the biological material in the best possible state.

Certain project activities may also affect species that are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and/or bald and golden eagles protected under the Bald and Golden Eagle Protection Act (BGEPA). The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the USFWS. BGEPA prohibits anyone, without a permit issued by the USFWS, from taking (including disturbing) eagles, and including their parts, nests, or eggs. If you believe migratory birds will be affected by the project, we recommend you contact our Migratory Bird Permit Office, P.O. Box709, Albuquerque, NM 87103, (505) 248-7882, or permitsR2mb@fws.gov. For more information regarding the MBTA, please visit the following websites: http://www.fws.gov/migratorybirds and http://www.fws.gov/migratorybirds/mbpermits.html.

For information on protections for bald eagles under the BGEPA, please refer to the USFWS's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) that were published in the Federal Register on June 5, 2007. Existing take authorizations for bald eagles issued under the Act became covered under the BGEPA via a final rule published in the Federal Register on May 20, 2008 (73 FR 29075). Our office is also available to provide technical assistance to help you with compliance.

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. The term "conservation recommendations" has been defined as USFWS suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility. In order for the

USFWS to be kept informed of activities that either minimize or avoid adverse effects or that benefit listed species or their habitats, the USFWS requests notification of the implementation of the conservation recommendations below. The USFWS recommends the following conservation recommendations be implemented:

New Mexico Meadow Jumping Mouse

1. We recommend that the Forest Service complete comprehensive jumping mouse surveys within areas that have not been surveyed since 2005 and 2006, but also in areas that contain suitable habitat. Surveys should also be conducted within areas where riparian vegetation is restored to document project success. This information will greatly assist all parties in gaining a better understanding the current status and whether habitat restoration leads to additional populations of the species. The Service will discourage the Forest Service from assuming future projects within potential jumping mouse habitat are occupied or continued to be occupied in lieu of conducting up-to-date surveys.

Jemez Mountains Salamander

1. We recommend that the Forest Service not avoid treatments in designated critical habitat for the salamander or potential salamander but rather continue to pursue how to best implement treatments to minimize impacts to salamanders and their habitat while improving habitat conditions and reduction of risk of high severity wildfire throughout the range of the salamander on Forest Service lands.
2. We recommend that the Forest Service continue to work with us identifying the occupied range of the species in potential habitat.
3. We recommend that the Forest Service continue to work with us to conduct targeted salamander surveys in potential habitat.
4. The Santa Fe National Forest will work with the USFWS to develop an occupancy model or scientifically sound equivalent that can be used to assess occupancy or changes in occupancy through time while taking into account factors that affect the probability of detection of the salamander

Mexican Spotted Owl

1. We recommend that the Forest Service work with us to conduct Mexican spotted owl surveys over the next several years to attempt to determine how owls modify their territories in response to wildland fires on the Santa Fe National Forest. This information will aid us in understanding the short- and long-term impacts of fire on the owl, and its subsequent effect on the status of the species in the SRM EMU. Surveys should be coordinated with the USFWS prior to implementation of any project.

2. We recommend that the Forest Service continue to work with us to design forest restoration treatments across the Santa Fe National Forest that protects existing nest/roost habitat from high-severity, stand-replacing fire, and enhance existing or potential habitat to aid in sustaining Mexican spotted owl habitat across the landscape. PACs can be afforded substantial protection from wildland fire by emphasizing fuels reduction and forest restoration in surrounding areas outside of PACs and nest/roost habitat.

REINITIATION - CLOSING STATEMENT

This concludes formal biological opinion on the proposed action on the effects of Southwest Jemez Mountains Restoration Project, Santa Fe National Forest Jemez Ranger District Sandoval County, New Mexico. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may 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 that was 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.

In future communications regarding this consultation please refer to consultation #02ENNM00-2012-F-0038. Please contact Eric Hein or Michele Christman if you have any comments or questions at the letterhead address or at (505) 346-4735 or 346-4715.

Sincerely,

WALLY MURPHY

Digitally signed by WALLY MURPHY
DN: c=US, o=U.S. Government, ou=Department of the Interior, ou=U.S. Fish and Wildlife Service, cn=WALLY MURPHY, 0.9.2342.19200300.100.1.1=14001000589970
Date: 2015.07.13 11:02:11 -06'00'

Wally "J" Murphy
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Shaula Hedwall, U.S. Fish and Wildlife Service, Flagstaff, Arizona

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APPENDIX A – FIGURES

Figure 1. Southwest Jemez Mountains Landscape Restoration Project area vicinity.

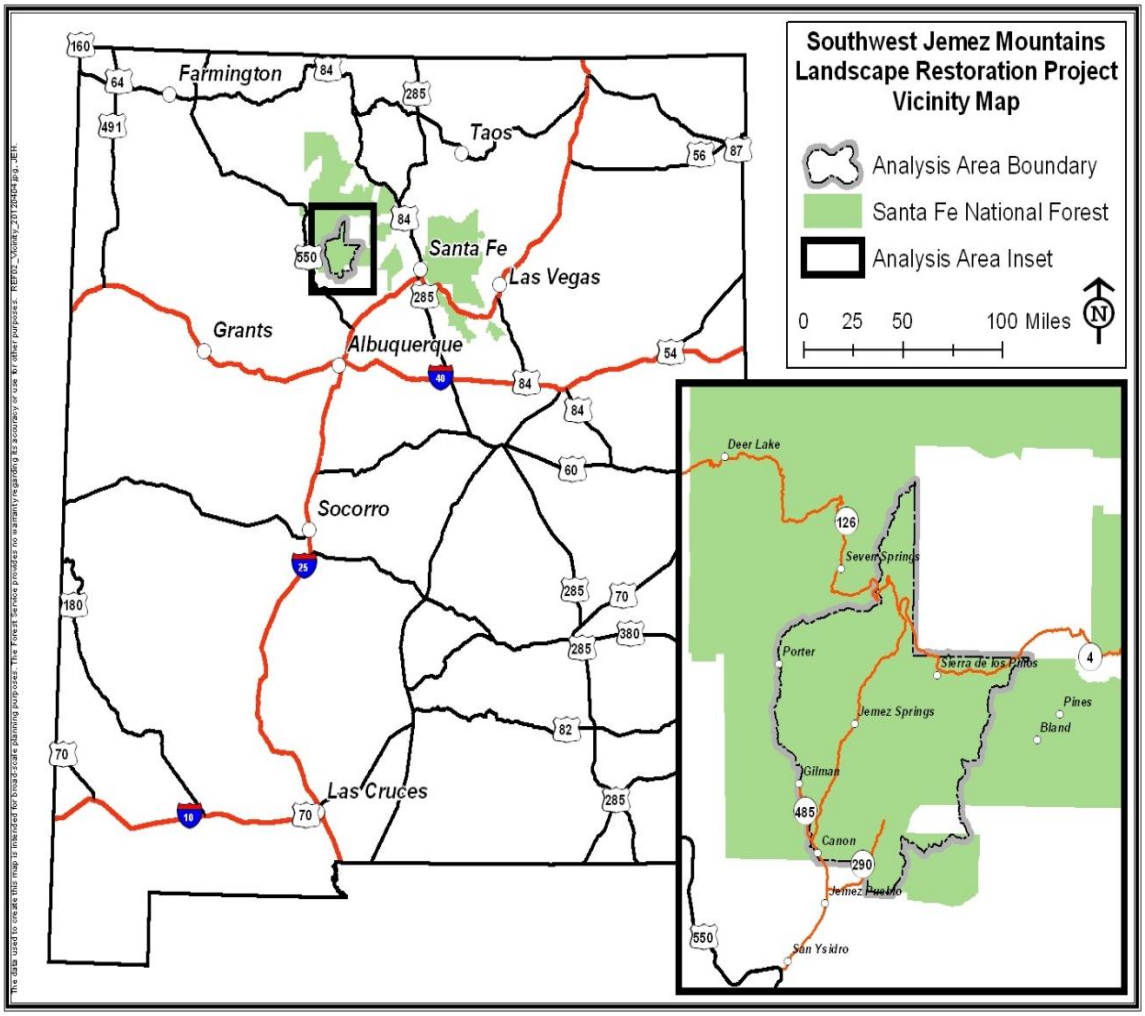

Figure 2. Mexican spotted owl Ecological Management Units.

SW Jemez Treatment Blocks by priority