United States Department of the Interior

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September 22, 2014

Cons. # 02ENNM00-2013-FC-0058

Bob Parmenter, Director Scientific Services
Valles Caldera Trust
P.O. Box 359
Jemez Springs, NM 87025

Dear Dr. Parmenter:

Thank you for your request for formal conferencing and subsequent consultation with the U.S. Fish and Wildlife Service (Service) 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 draft Biological Assessment on June 30, 2012, followed by a request for formal consultation (conference) on December 10, 2012. We had subsequent correspondence, and on March 20, 2013, we received a revised draft Biological Assessment, and cover letter where you determined that the proposed action "may affect, is likely to adversely affect" the Jemez Mountains salamander (*Plethodon neomexicanus*) (salamander) and its proposed critical habitat. At that point, the salamander and critical habitat were proposed; however, on September 10, 2013, the salamander was listed as an endangered species (78 FR 55600) and on November 20, 2013, critical habitat was designated (78 FR 69569) under the Act. We had several email communications and met in person where we further discussed the proposed action, potential conservation measures, and requested additional information. On May 16, 2014, we received additional information and final Biological Assessment for the salamander contained within your document titled "Landscape Restoration and Stewardship Plan: Environmental Impact Statement Supplemental Biological Assessment" (BA), and an updated request for formal consultation for your determination "may affect, is likely to adversely affect" the federally endangered salamander and its critical habitat. At issue are impacts that may result from the proposed Forest Restoration on the Valles Caldera National Preserve.

Your proposed action consists of implementing the Landscape Restoration and Stewardship Plan (Stewardship Plan), on the Valles Caldera National Preserve (Preserve), in Sandoval and Rio Arriba counties, New Mexico. The Stewardship Plan consists of a 10-year strategy for managing and restoring the natural systems of the Preserve through integrated stewardship actions including vegetation management, erosion control, riparian and wetland restoration, and rehabilitation. The proposed Stewardship Plan is based on the collaborative forest landscape restoration strategy developed for the Southwestern Jemez Mountains Landscape (Valles Caldera Trust, Santa Fe National Forest 2010) and incorporates New Mexico Forest Restoration Principles and Ecological Restoration of Southwestern Pine Ecosystems: A Broad Perspective

(Allen et al. 2002). The actions described in the Stewardship Plan and analyzed in the Final BA are hereby incorporated by reference.

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 salamander critical habitat to determine whether the action destroys or adversely modifies critical habitat.

CONSULTATION HISTORY

This biological opinion (BO) is based on information provided in the Final BA, telephone conversations, email messages, and other sources of information. Literature cited in this BO is not a complete bibliography of all literature available on the salamander, fuel reduction projects and their effects, or on other subjects considered in this BO.

The current document constitutes the Service's BO based on our review of the proposed action and its effects on the salamander and its designated critical habitat in accordance with section 7 of the Act.

Collectively, the Trust and the Service agreed to meet annually to coordinate and share information regarding accomplished actions and planned actions for the next year. This process will assist in reducing impacts to the salamander, its habitat, and the primary constituent elements (PCEs) of critical habitat and to maximize the conservation of the species. While we generally anticipate that the Stewardship Plan will result in long-term conservation benefits for the salamander, there still remains uncertainty on the short- and long-term effects of some of the treatments. 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, 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*
June 30, 2012	Began early coordination on a draft Biological Evaluation for the project.
July 20, 2012	Provided comments on draft Biological Evaluation dated June 30, 2012.
August 15, 2012	Received letter dated August 14, 2012, and attached Biological Evaluation requesting review and concurrence of assessment on candidate and species of concern that may be affected by the proposed action.

October 2, 2012	Field visit between Valles Caldera Trust staff and Service. Proposed action and consultation process discussed; examples provided to Trust staff.
November 28, 2012	Service provided clarification on the status on the Jemez Mountains
December 10, 2012	Received a Biological Evaluation and request for formal consultation on the proposed action to the candidate and proposed species, the Jemez Mountains salamander, and its proposed critical habitat.
February 6, 2013	Received an email requesting status of request for consultation.
February 6, 2013	Service provided comments on the Biological Evaluation and associated Environmental Impact Statement and requested additional information.
March 20, 2013	Received cover letter requesting formal conferencing for the Jemez Mountains salamander and its proposed critical habitat.
March 20, 2013	Received a revised draft Biological Assessment.
April 29, 2013	Met to discuss the project and additional information or clarifications
May 6, 2013	Received a final BA with supplemental information.
June 18-June 21, 2013	Exchanged emails and telephone calls regarding potential updates to the BA subsequent to the Thompson Ridge Fire.
September 13, October 17, 2013	Exchanged emails noting that updates to the BA subsequent to the Thompson Ridge Fire were underway.
December 16, 2013	Received an addendum to the BA that included updates to incorporate impacts from the Thompson Ridge Fire.
February 11, 2014	Phone conversation discussing additional information needed, including analyses to final critical habitat for the salamander and estimates of the amount of salamander habitat affected by each kind of treatment proposed in the action. The Service summarized this information in an email dated February 12, 2014.
March 17, 2014	Received a Supplemental Biological Evaluation that analyzes the effects of the action to final critical habitat for the salamander.
March 24, 2014	Met to Trust to discuss the Supplemental Biological Evaluation and approaches to annual meetings as part of the action.
May 16, 2014	Received the Final BA.
May 17, 2014	Received the FY2015 Annual Consultation Report for FY2015 planned activities.
May 17-Aug 29, 2014	Corresponded through email minor clarifications.
September 18, 2014	Provided a Draft Biological Opinion for your review.
September 19, 2014	Provided comments on the Draft Biological Opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Most of the information regarding the project in this BO is from the final BA (May 16, 2014)) and the July 29, 2012 Wildlife Biological Evaluation (Parmenter, Rodriguez, and DeVault 2012). The full project description from these documents is incorporated by reference and summarized below.

The proposed action will be implemented throughout the approximately 89,000 acres of the VCNP and consists of integrated restoration and management actions including forest thinning, wildland fire management, riparian and wetland restoration, post wildfire rehabilitation, road closure, decommissioning, and maintenance and erosion control; noxious weed eradication, research, inventory, and monitoring, and performance requirements associated with implementing the action to minimize adverse effects to the salamander, its habitat, and its designated critical habitat PCEs (see **Jemez Mountains Salamander Conservation Measures on page 24**). The purpose of the proposed actions is to improve the resilience and adaptive capacity of the Preserve's natural systems and to rehabilitate areas severely burned during the Las Conchas Wildfire (2011). The 10-year Stewardship Plan is intended to:

1. Move the structure, composition, and function of the Preserve's natural systems towards the reference condition.
2. Reduce the potential for unusually severe or extensive wildfire.
3. Reintroduce fire as a natural disturbance and beneficial process on the landscape.
4. Improve the characteristics of terrestrial and aquatic wildlife habitat.
5. Improve water quality and watershed function.
6. Repair and rehabilitate areas adversely affected by historic infrastructure, wildfire, and post fire flooding and erosion.
7. Enhance the objectives on surrounding lands and benefit local communities and business.

The project will reduce forest tree densities and fuel loadings throughout most of the project area to reduce the risk of severe wildfire. To develop a proposed strategy over the next 10 years that will move the forests of the VCNP towards the reference condition at the landscape scale, you evaluated several forest attributes at the stand level: fire regime, vegetation type, structure, composition, fire behavior potential, slope, and soils. Stands being proposed for treatments were selected based on the criteria from the restoration strategy submitted for funding under the collaborative forest restoration program ecological departure and fire behavior potential (Valles Caldera Trust, Santa Fe National Forest 2010).

Forest Restoration Treatments

Mechanical Treatment Areas and Acres

You identified 27,312 acres as suitable and in need of mechanical treatment. Mechanical treatments include cutting, selectively cutting, pruning, or masticating of standing trees using chainsaws or heavy equipment and the removal, mastication, burning, or other method of

biomass disposal. All areas planned for mechanical treatment will subsequently be planned for fire treatment. Specific activities that may be associated the mechanical treatments include:

- Cutting trees using a chainsaw operated by hand or mounted on specialized equipment
- Cutting trees using heavy equipment.
- Yarding or skidding trees from the forest to a landing site for removal (chips, logs, firewood, etc.)
- Masticating standing trees or pushing over and masticating trees on the ground
  - leaving the material on site
  - removing the chipped material
- Lopping off and piling or spreading tops and branches of trees
- Removal as firewood by individuals with pickups
- Stockpiling logs or slash for removal or disposal (burning or chipping)
- Constructing fenced exclosures to protect restored areas from impacts by elk or livestock.
- Camping by crews or contractors
- Improving or maintaining roads for temporary access
- Construction of up to 1,320 feet of new temporary roads
- Closing and rehabilitating temporary roads and/or skid trails
- Biomass disposal (resulting from mechanical forest thinning) may include:
  - Utilization: biomass is removed from areas for a variety of uses including firewood, latillas, posts and poles, or small dimensional lumber. The biomass can also be chipped for use in landscaping or to fuel burners for heat or energy. The material may be removed by: *yarding* (using cables to pull partially or fully suspended logs or trees) or *skidding* (using heavy equipment to drag or carry logs or trees) biomass to a road or landing point.
  - Mastication or chipping and left on site; some equipment is capable of thinning and masticating trees simultaneously.
  - Piling for burning under low risk conditions
  - Lopping and scattering.
  - Wildland fire, alone or in combination with any other biomass disposal method.

Based your current capacity including staffing and expected levels of funding, you are proposing to treat nearly 80 percent of the 27,312 acres identified as suitable and in need of mechanical treatment, or approximately 21,500 acres over the next 10 years. Table 2 displays the total acres within the identified ecotypes, the acres suitable for mechanical treatment, the type of mechanical treatments, and the acres you expect to treat over the 10-year planning period. The mechanical treatments have been organized into five priorities based on the degree of ecological departure, fire risk (fire behavior potential as well as proximity and alignment to historic fire occurrence), fire behavior potential, and values at risk (and vulnerable) to damage or loss from fire. Priorities generally begin in the southwestern corner of the VCNP and continue to the north, with the fifth priority a small unit in the southern portion (Figure 1).

Table 2. Proposed mechanical treatment acres on the Valles Caldera National Preserve.

Fire Regime & Ecotype	Treatment Criteria	Potential Treatment Acres	Prescriptions	10-Year Treatment	Potential Utilization
FR I – Ponderosa Pine; Xeric Mixed Conifer	Average Slope[1] ≤ to 25%	7,860	REST	7,860	Yes
FR I – Montane Grasslands	Encroachment by conifer	3,236	REST	3,236	Yes
FR III – Mesic Mixed Conifer; Aspen/Mixed Conifer	Average Slope ≤ 25%, Fire Intensity Class[2] = IV or V	8,527	ASRE, FOHE	7,500	Yes
FR III – Mesic Mixed Conifer; Aspen-Mixed Conifer	Slope >25%, Fire Intensity Class = V, erosive soils.	3,840	HFRE	1,500	No
FR IV – Xeric Spruce-fir; Mesic Spruce-fir	Slope ≤ 25%, Fire Intensity Class = IV or V	2,620	HFRE	1,200	Yes
FRIII – Mixed Montane Woodlands	Gambel oak dominate species	1,229	HFRE	200	No
Totals		**27,312**		**21,496**	

[1] Each forest stand is attributed with an average slope. This attribute was used to identify stands on "generally" operable ground. Performance requirements limit the use of heavy equipment to slopes less than 30 percent. Actual slopes will be used to identify operable ground.

[2] Fire Behavior Potential is indicated by a Fire Intensity Class attribute of I-VI, with one being the least potential and VI being the greatest.

Bob Parmenter, Director Scientific Services

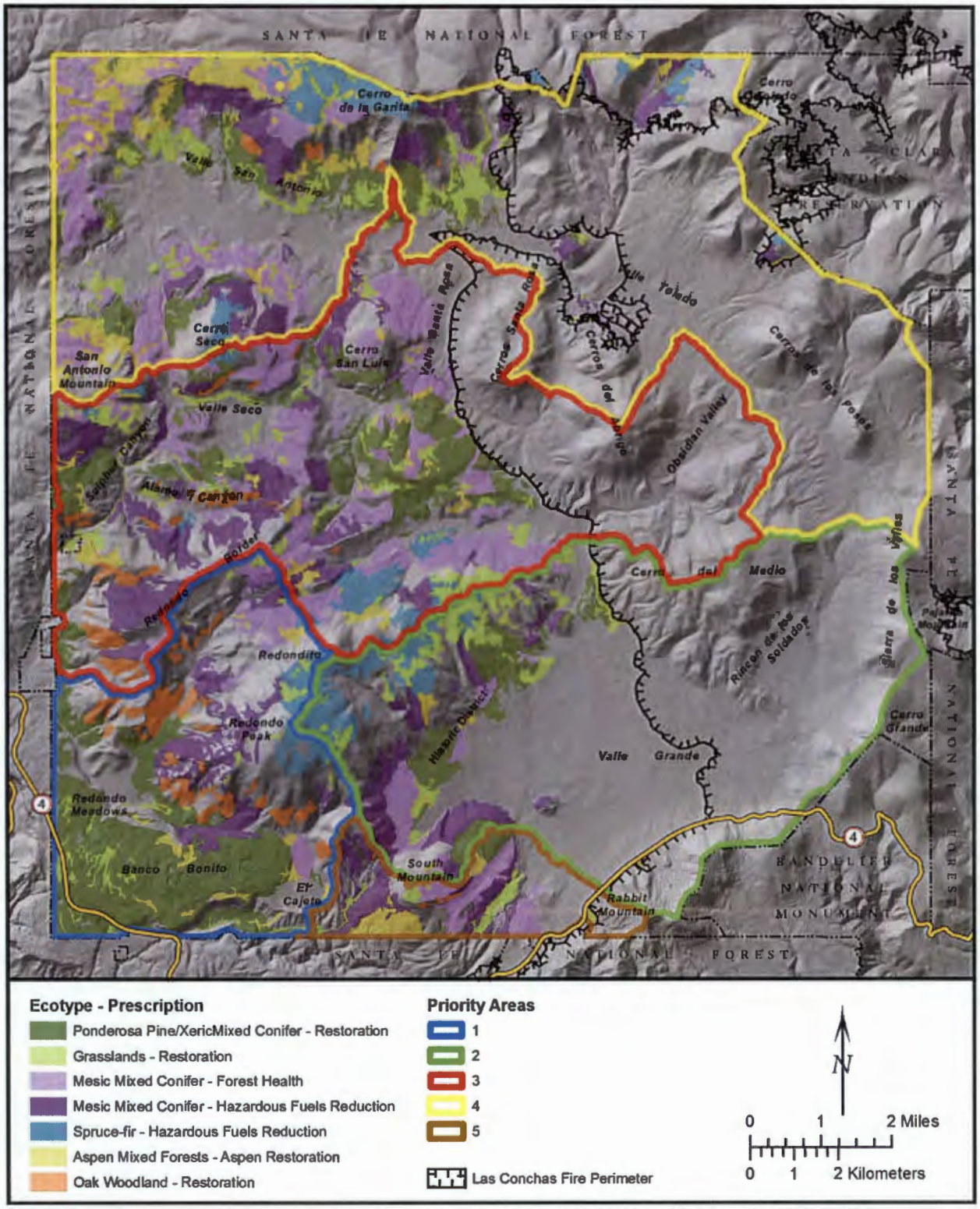

Figure 1. Proposed mechanical treatment areas on the Valles Caldera National Preserve

Mechanical Treatment – Prescription Guidelines

Mechanical treatments can be used at various prescriptions (intensity and design) to achieve the desired outcome. Proposed prescriptions have been developed based on fire regime, vegetation type, current fire behavior potential[3], current structure and composition, slope, soils, and climate and/or the desired outcome following treatment. Prescriptions and guidelines for mechanical treatment are presented in Table 3. Within designated critical habitat, the VCNP will focus on protecting and preserving the existing PCEs essential to the conservation of the species, as well as to move towards conditions in the future, where PCEs for the salamander can be recruited and maintained to support the life-history processes of the species into perpetuity.

Table 3. Prescriptions and guidelines for mechanical treatments

Activity Code	Prescription	Guidelines
MECH	Restoration - REST	Reduce canopy closure to 30-60 percent over a landscape area with a target Basal Area (BA) of 40-75 ft^2. Leave groups and clumps representing all age classes. Select trees based on size, species, and vigor.
MECH	Aspen Regeneration - ASRE	Target conifer species growing in and adjacent to aspen trees. Removal of individual trees and group selection with a target BA of 40-60 ft^2.
MECH	Forest Health - FOHE	Reduce tree densities, remove suppressed, damaged, or diseased trees; and reduce hazardous fuels (remove ladder fuels, break up surface and canopy fuel continuity, raise canopy base height) with a target BA of 50 -75 ft^2. Less intensive degree of thinning than "restoration".
MECH	Hazardous Fuels Reduction - HFRE	Remove ladder fuels[4], disrupt the continuity of canopy and surface fuels, and raise canopy base height with a target BA of 60-95 ft^2.
MECH	Wildland Fire Control - WFCO	Reduce canopy closure to 30 to 50 percent in a localized area; size of treatment area based on slope and fuels and may vary in intensity. Strategically located to provide an anchor for wildland fire management.

[3] Each forest stand is attributed with a fire potential rating based on a scale of 1-6. See *Chapter 4 – Affected Environment.*

[4] Ladder fuels are small trees, brush or slash that provide a "ladder" for fire to move from the ground to the forest canopy.

Table 4 – Acres of critical habitat identified as suitable and in need of forest thinning by prescription and burn severity.

Burn Severity	ASRE	FOHE	HFRE	REST	Total	Comments
High	25.64	903.50	522.95	292.19	1744.28	High severity burn areas, contour felling erosion control
Low	20.80	296.42	172.45	106.73	596.39	
Moderate	337.60	225.60	948.45	561.16	2072.82	Moderate severity lower priority
Unchanged		37.07		890.66	927.73	
Unburned	618.33	2283.20	3876.59	3045.55	9823.67	
Total	1002.36	3745.79	5520.44	4896.30	15164.89	

Mechanical Treatment – Prescriptions by Ecotype

Prescription is the term used to refer to the descriptive parameters for selecting trees to be cut versus those to be left. The Trust is proposing a series of basic prescriptions based on fire regime and ecotype. These prescriptions may be adjusted based on site-specific considerations including access, slope, and soils as these factors may limit your ability to remove or otherwise dispose of biomass. Where your ability to remove biomass is limited, a less intensive prescription and/or multiple entries may be used.

Fire Regime I - Ponderosa Pine Woodland and Savanna, Dry Mixed Conifer

This prescription leaves the largest and healthiest trees in groups with 10-20 feet between tree canopies and 25-50 feet between groups of trees. The largest and most vigorous ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) as well as inclusions of aspen (*Populus tremuloides*) will be favored for retention. Based on field-sampled data, white fir and ponderosa pine will be targeted for removal; the majority of the white fir (*Abies concolor*) trees are under 7" in diameter.

Fire Regime I - Montane Grasslands

A restoration prescription will be assigned where ponderosa pine ponderosa pine trees are encroaching into the grasslands. Prescriptions will retain small well-spaced groups (60-100 feet between groups) of the healthiest trees. Where blue spruce (*Picea pungens*) trees are encroaching, trees average from 7-9" in diameter. Blue spruce will be lightly thinned in an irregular pattern to reduce the susceptibility to wind throw and protect soils, while enhancing watershed function.

Fire Regime III - Aspen and Mesic Mixed-Conifer

Forest health, aspen regeneration, and hazardous fuels reduction prescriptions will be assigned to these forests emphasizing the removal of ladder fuels[5], trees impacted by insects, trees with visible signs of damage or disease, and fire intolerant species (white fir, blue spruce, Engelmann spruce (*Picea engelmannii*). Based on measures taken in the field, conifers, especially white fir and spruce, less than 9" in diameter will be targeted for removal. Some stands contain over 1,000 aspen trees per acre, most under 5" in diameter. In these stands, the emphasis will be to remove overstory conifers that shade the aspen. The largest, most vigorous aspen, Douglas-fir, and ponderosa pine, will be favored for retention. Limber pine (*Pinus flexilis*) will also be retained[6].

Fire Regime IV - Mesic and Dry Spruce-fir

Hazardous fuels reduction prescriptions will be used to reduce the potential intensity and severity of wildland fire across the landscape. Planned prescription parameters will select small, disease or damaged trees for removal. The largest, healthiest trees of all species will be favored for retention. Fuel-break prescriptions will be used strategically to improve the safety and effectiveness of wildland fire management. Based on measures taken in the field, trees targeted for removal will be white and subalpine fir less than 5" in diameter and Engelmann spruce less than 7" in diameter. Healthy Engelmann spruce, Douglas-fir, and aspen will be favored for retention.

Fire Regime III Mixed Montane Woodlands

Wildlife habitat improvement prescriptions will be used to create patches and corridors of various size classes emphasizing the retention of mature shrubs and trees. Conifers less than 9" in diameter will be targeted for removal; healthy large conifers and oak trees and shrubs will be retained.

All Fire regimes/ecotypes - Hazardous Fuels Reduction on Steep Slopes

On steep slopes with a very high fire behavior potential, treatments may use a hazardous fuels reduction prescription. This prescription focuses on removing ladder fuels (small trees, brush and slash) and breaking up the continuity of the fuels. Biomass is generally hand piled or lopped and scattered for later burning. Small tree yarding systems, which fully or partially suspend trees, could also be used.

All Fire regimes/ecotypes - Wildland Fire Management Control

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[5] "Ladder fuels" refer to trees small to medium sized trees arranged to create a "ladder" of fuel that would allow fire to move from the surface into the crowns of the larger trees.

[6] White pine blister rust is present regionally indicating that white should be retained to ensure the greatest degree of genetic heterogeneity is present.

Localized thinning or fuel-break construction may be used in association with control lines or to protect cultural or natural features from fire.

All Fire regimes/ecotypes - Responding to Natural Events

Under the proposed Stewardship Plan you propose to use mechanical treatments to restore and rehabilitate burned areas or areas impacted by insects and disease as follows:

- To reduce secondary risks created by dead and dying trees the trust will implement any of the prescription options for mechanical treatment – all performance requirements will apply.
- To stabilize areas following a loss of vegetation from wildfire you propose to cut trees, and either lop and scatter or masticate biomass to provide surface cover. On steep slopes, the boles of trees could be anchored horizontally along the slope to capture soil and reduce erosion as illustrated in Figure 8.
- To reduce the spread of insects or disease infected trees may be removed or isolated if it is determined that such treatment can be timely and effective – all performance requirements will apply.

Wildland Fire – Areas and Prescriptions

Fire has been an essential process in the landscapes in and around the preserve for the past 10,000 years (Allen 1989) and in general wildland fire could potentially be applied beneficially to most ecotypes on the preserve. However, funds and environmental conditions limit the amount of acres proposed for treatment during the planning period. Generally, wildland fire management includes the management of both planned and unplanned ignitions to achieve resource management objectives as well as resource protection objectives. Wildland Fire-Prescribed Fire (WFPF) is a planned ignition of wildland fire under prescribed environmental conditions (prescribed fire) and may be used to achieve resource benefits including biomass disposal. Planned ignitions may be used alone or in combination with mechanical treatments. Wildland Fire -Wildfire (WFWF) result from unplanned ignitions that can be suppressed to meet protection objectives or managed for resource objectives or some combination thereof. Only lighting caused fires can be managed for resource objectives and only if environmental and other conditions are appropriate. Unplanned human caused fires are managed with safety and protection as the primary objectives. Wildfire suppression is not considered part of the proposed action; these will follow emergency section 7 consultation procedures. Due to the current fire behavior potential most managed burning within forest types will follow mechanical treatment. Table 5 presents proposed prescribed burning over the 10-year planning period. The table is followed by a narrative description of proposed burning.

Table 5. Proposed prescribed burning on the Valles Caldera National Preserve.

Fire Regime	WFPF Only	WFPF in combination with MECH	Prescriptions	Total WFPF
FRI	17,415	11,095	LOWS	28,510

FRIII &IV	10,915	10,400	MIXS	21,315
Totals	**28,330**	**21,495**		**49,825**

Ponderosa Pine Woodland and Savanna, Dry Mixed Conifer, and Montane Grasslands

Prescribed fire will be used in these forest types alone or following appropriate mechanical treatments. Prescriptions parameters will emphasize low severity and intensity fire burning continuously (>50 percent) across the landscape to reduce hazardous fuels, restore composition and structure, or dispose of biomass resulting from mechanical treatment.

Aspen and Mesic Mixed Conifer Forests

Wildland fire will be used in these forest types alone or following appropriate mechanical treatments. Prescriptions will promote low to mixed severity and intensity fire with patchy (<50 percent) continuity to reduce hazardous fuels, restore structure and composition, and dispose of biomass resulting from mechanical treatments.

Gambel Oak-Mixed Montane Woodlands

Wildland fire will be used to enhance structural diversity and wildlife habitat improvements initiated by mechanical treatments. Prescriptions will promote low severity and intensity, patchy and discontinuous burning (<50 percent) across the landscape to restore structure and composition and dispose of biomass resulting from mechanical treatment.

Dry and Mesic Spruce-fir Forests

Wildland fire will be used in these forest types alone or following mechanical treatments. Prescriptions will promote low to mixed severity and intensity fire with patchy (<50 percent) continuity to reduce hazardous fuels restore structure and composition and dispose of biomass resulting from mechanical treatment.

Wildland Fire Planned and Unplanned Ignitions

Any unplanned human caused ignitions will be managed for protection and will select the safest, most cost effective means to extinguish such fires. However, the VCNP will consider managing any lightning caused wildland fires to enhance management objectives. The management of these fires will be limited initially due to the current fire behavior potential, but could be expanded over time as more of the forests are treated and the fire behavior potential is reduced. Consistent with the *Guidance for the Implementation of the Federal Wildland Fire Management Policy*, reviewed and updated in 2009 (NWCG 2009) and the *Interagency Prescribed Fire Planning and Implementation Guide*, reviewed and revised in 2008 (USDA/USDOI 2008), any use of wildland fire will consider current climate trends, expected weather, potential fire behavior, the impacts of wildland fire on other activities on the preserve, and the amount and duration of smoke impacts in surrounding communities. The primary objective for managing

any planned or unplanned wildland fire is safety; the safety of firefighters, the public, as well as employees, volunteers, contractors, or others.

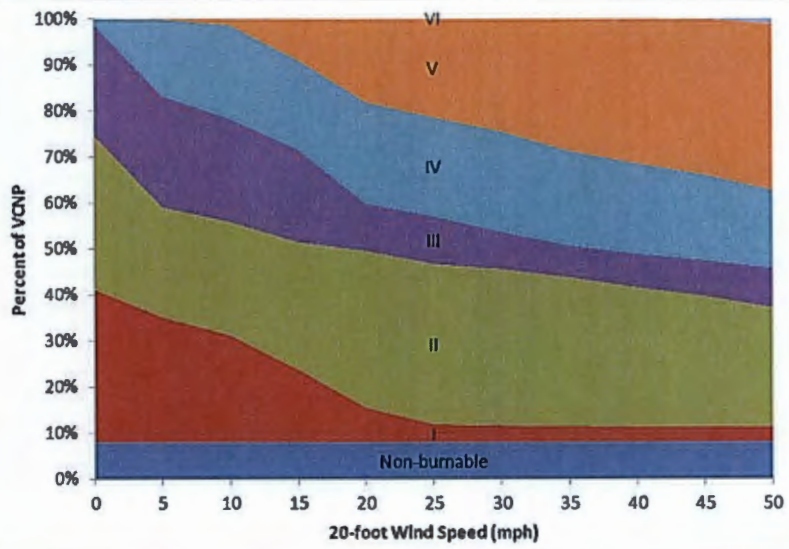
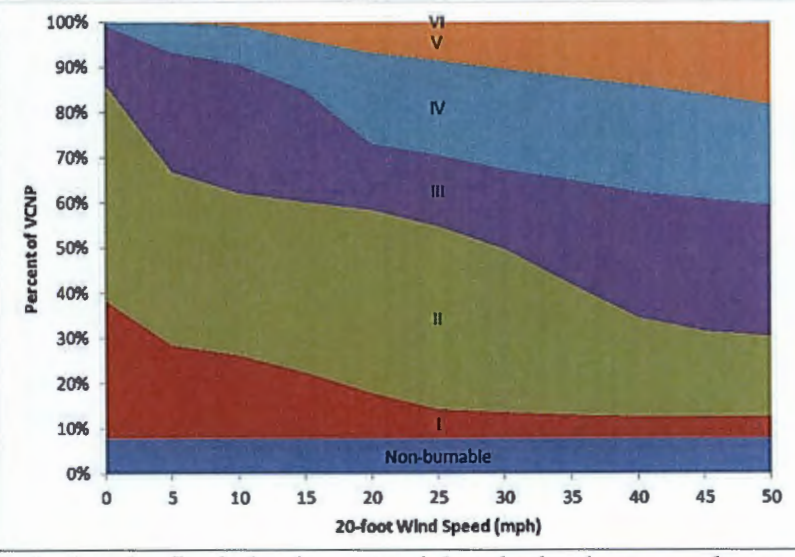
Burn severity relates to the effects caused by heat and duration especially to the downward flux of heat and associated changes to soil properties. Burn severity relates well to fire intensity in forest fuels[7]. Burn severity is related to the total heat per unit area produced by the fire and is greatly influenced by fuel volume. Table 6 describes the classification of fire behavior and Table 6 that follows compares the fire behavior potential on the landscape in the present condition (current condition) and following the proposed action.

Table 6 - Fire Intensity Scale (FIS) classification of fire behavior (Scott November 2006)

Fire Intensity Scale (FIS) Class	Description of fire behavior
I	Very small, discontinuous flames, usually less than 1 foot in length; very slow spread rate; no spotting.
II	Small flames, usually less than two feet long; small amount of very short-range spotting possible.
III	Flames up to 8 feet in length; short-range spotting is possible.
IV	Large flames, up to 30 feet in length; short-range spotting common; medium-range spotting possible.
V	Very large flames up to 150 feet in length; copious short-range spotting, frequent long-range spotting; strong fire-induced winds.
VI	Extraordinary flame size, greater than 150 feet in length; copious spotting; very strong fire-induced winds.

[7] Grassland and shrubland fuels can burn with very high intensity while having low severity effects due to the relatively light fuel loads in these fuel types.

Table 7. – Comparison of fire behavior potential across the preserve under the existing condition (top) and proposed action (bottom)

	Existing Condition FIS Class as a percent under various weather scenarios
	Proposed Action Collaborative Restoration Strategy FIS Class as a percent under various weather scenarios

Reducing the fire behavior potential at the landscape scale can give fire managers the option of employing *Minimum Impact Suppression Tactics* (*MIST)* in the future. These tactics employ the mindset of effective fire suppression with minimum damage or impact from suppression tactics and include guidance for suppression and mop-up including the following which directly relate to the protection of salamander habitat and designated critical habitat PCEs:

Suppression

- Allow fire to burn to natural barriers.
- Use cold-trail, wet line or combination when appropriate.
- If constructed fireline is necessary, use only width and depth to check fire spread.

- Burn out and use low impact tools like swatter or 'gunny' sack.
- Minimize bucking and cutting of trees to establish fireline; build line around logs when possible.
- Limb vegetation adjacent to fireline only as needed to prevent additional fire spread.
- During fireline construction, cut shrubs or small trees only when necessary. Make all cuts flush with the ground.
- Minimize felling of trees and snags unless they threaten the fireline or seriously endanger workers. In lieu of felling, identify hazard trees with a lookout or flagging.
- Scrape around tree bases near fireline if it is likely they will ignite.

Mopup

- Do minimal spading; restrict spading to hot areas near fireline.
- Cold-trail charred logs near fireline; do minimal tool scarring.
- Minimize bucking of logs to extinguish fire or to check for hotspots: roll the logs instead if possible.
- Return logs to original position after checking and when ground is cool.
- Refrain from making bone yards; burned and partially burned fuels that were moved should be returned to a natural arrangement.
- Use a lever rather than bucking to manage large logs which must be extinguished.
- Personnel should avoid using rehabilitated firelines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work, i.e. water bars.
- Remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.
- Identify hazard trees with a lookout or flagging rather than falling.
- If burning trees/snag pose a serious threat of spreading fire brands, extinguish fire with water or dirt whenever possible.

<u>Other Activities Associated with Wildland Fire - Planned Ignitions</u>

Wildland fire management activities include actions to prepare, ignite, control, or otherwise manage wildland fire. All existing best management practices, conservation measures, and performance requirements for working in salamander habitat apply; however, occasional exceptions may be required to carry out a planned ignition wildland fire. Any potential exemptions will be coordinated at the annual consultation meeting, and efforts will be made to avoid impacts to salamander habitat. The following activities are associated with carrying out a planned ignition fire:

- Construction of control lines (clearing all vegetation and debris to expose only bare dirt or rock) using hand tools or mechanized equipment. Existing roads and control features

will primarily be used with some hand line or plow line as needed. These lines are planned and constructed in advance, used minimally and not implemented through archaeological sites or salamander habitat.

- Igniting fire by hand using a gasoline-diesel fuel mix, mixing and dispensing of the fuel mixture, and use of aerial ignition devices.
- Management of aircraft (helicopters) including staging and refueling will occur outside of salamander habitat and primarily occur in areas of previous disturbance.
- Use of approved foaming agents or water to retard the spread of fire or to protect sensitive features.
- Use of approved foaming agents or water in combination with digging and scraping to extinguish fire.
- Reducing concentrations of fuel adjacent to control lines or surrounding sensitive features by hand or using equipment.
- Storage or staging of water tanks and vehicles; staging, parking, and turning vehicles and equipment; and establishing camps for short term staging of vehicles, personnel and project management will be done outside of salamander habitat, or on existing disturbed features such as a road bed or well pad.

Other Activities Associated with Wildland Fire - UnPlanned Ignitions

Any of the associated activities described for Planned Ignitions above could be needed for unplanned ignitions as well, only with less ability to plan or control the location of the actions. The Trust will to the greatest extent practical, use existing roads as fire breaks, avoid, or go around areas known to have high densities of salamanders, implement all other conservation measures, in addition to instructing fire-fighting crews to avoid old logs and stumps and rock-piles when laying out hand line. Equipment operators will be instructed similarly, although lines created by bulldozers are less flexible in certain locations. Localized thinning or fuel-break construction may be used in association with control lines or to protect cultural or natural features from fire. All best management practices, conservation measures, and performance requirements will be in place unless the specifics of managing an unplanned fire requires action outside of those requirements. Managing an unplanned fire can impose conditions that are not within the control of the Trust but are still expected to have long-term benefits to the salamander and its habitat.

Biomass disposal and hazardous fuels reductions will be the highest priority for planned ignitions. Opportunities to implement planned ignitions can be limited by environmental conditions and lack of resources. As mechanical treatments are completed opportunities to manage wildland fire will increase. Planned ignition projects will be used to treat larger landscapes whenever possible and consistent with desired outcomes. You have proposed to use prescribed fire alone and in combination with mechanical treatments. Wildland fire management would be consistent with, but not necessarily imitative of, the fire regimes that have influenced the structure, composition, and function of the preserve's ecosystems prior to European settlement.

The following performance requirements are part of the proposed action to reduce the effects to the salamander, its habitat, designated critical habitat PCE's in all wildfires:

- Within the Wildland Fire Decision Support System (WFDSS), for each incident with the potential to affect salamanders, salamander habitat or designated critical habitat, protection of the salamander, important habitat features, and designated critical habitat will be among the primary objectives.
- For each such incident, the potential effects of fire versus suppression will be assessed and alternatives that are likely to result in the least degree of adverse effect to the salamander and its habitat and where consistent with public and fire fighter safety and protection of homes, and critical infrastructure will be selected.
- Management of aircraft (helicopters) including staging and refueling away from salamander habitat.
- Use approved foaming agents or water to retard the spread of fire or to protect sensitive features. Foaming agents will not be used in salamander habitat.
- Use approved foaming agents or water in combination with minimal digging and scraping to extinguish fire in lieu of heavy equipment and dry mopping. Foaming agents will not be used within salamander habitat.
- Locate areas to store or stage water tanks and vehicles away from salamander habitat.
- Staging, parking, and turning vehicles and equipment from away salamander habitat.
- Establish camps for short term staging of vehicles and personnel and project management away from salamander habitat

Responding to Natural Events; Post-Fire/Insect Attack Restoration Actions

Under your proposed Stewardship Plan, you propose to use mechanical treatment to restore and rehabilitate burned areas or areas impacted by insects and disease as follows:

- To reduce secondary risks created by dead and dying trees you may implement any of the prescription options for mechanical treatment – all performance requirements would apply.
- To stabilize areas following a loss of vegetation from wildfire you may cut trees, and either lop and scatter or masticate biomass to provide surface cover. On steep slopes, the boles of trees could be anchored horizontally along the slope to capture soil and reduce erosion.
- To reduce the spread of insects or disease infected trees may be removed or isolated if it is determined that such treatment can be timely and effective – all performance requirements shall apply.
- In areas where mastication or removal of killed trees takes place, five large (largest available) logs per acre will be left to supplement or replace logs burned by wildfire, and provide cover objects for salamanders active above ground. Douglas fir will be selected first if available.

Road Management

Road management includes the administrative and physical closure, decommissioning, and repair and maintenance of roads. Administrative road closures will prohibit motorized use of a road to encourage natural revegetation. This action may include the placement of barriers. Non-motorized (pedestrian, equestrian, or bicycle) use may be permitted. Decommissioning of roads consists of physical road rehabilitation to promote natural revegetation. Activities may include the placement of biomass or logs on roads or may require creating drainage or installing culverts. Maintenance may include road grading, reconstruction of road prism, realignment to improve safety or to protect resources, and construction of drainage features such as lead out drainage features such as lead out ditches and the placement or replacement of culverts.

The trust is proposing to move the current road density from an average of 9 mi/mi^2 to 1.5 mi/mi^2. Meeting this objective will require closing and/or decommissioning about 1,000 miles of road over 10 years. Based on soils and hydrology, road closure and decommissioning will primarily be achieved through administrative closure and natural rehabilitation. Approximately 100 - 150 miles of road have been identified as needing physical decommissioning and rehabilitation. Most of this will occur at localized points, less than 500 linear feet, where active erosion is occurring.

Approximately 52 miles of the 200 miles of roads to be maintained for ongoing use are in need of deferred maintenance to restore hydrology or halt ongoing erosion. Deferred maintenance activities include:

- Reshaping and resizing the existing road prism.
- Realignment to alter grades or reduce erosion.
- Constructing lead-outs, or installing or replacing culverts to improve drainage.
- Replacing fill
- Extracting and hauling aggregate material (gravel, rock, dirt, etc.).
- Staging equipment.

Currently deferred maintenance activities are ongoing on open roads in the VCNP and this will continue. Existing roads were developed to support of past logging, hunting, ranching and geothermal development. Other infrastructure features associated with the roads include well pads, log landing or livestock gathering areas. Rehabilitation of these localized features will generally include erosion control (placement of logs, rocks, or man-made features to halt erosion), construction of contours or placement of culverts to provide drainage, or soil scarification to promote the establishment of native grasses.

The priority for physically decommissioning and rehabilitating roads will be site-specific areas rather than landscape areas. Road alignments which are directly affecting water quality, diverting wetlands, increasing overland flow, or impacting cultural resources will be the first priority, as opposed to more stable areas of localized erosion. The priority for completing

deferred maintenance will be based on current condition, level of use and current resource impacts.

As part of your proposed action you are including conservation measures to minimize adverse effects to salamanders, their habitat, and designated critical habitat for actions related to road management on the preserve. No new road construction is being proposed and you will avoid temporary construction. However, there may be some circumstances where temporary roads construction may be warranted. Examples could include places where the old road is causing erosion due to its location or alignment, or an existing road already exists but should not be used to further protect sensitive or natural resources. Within salamander critical habitat, new temporary roads will not be established except only as necessary to directly achieve the protection and improvement of salamander critical habitat or otherwise benefit the salamander. Furthermore, actions related to road management will avoid impacts to salamander habitat to best extent practical. For example, salamander habitat features and PCEs will be avoided, and constrained to the shoulders of existing roads, and aggregate material (e.g. gravel, rocks, soil) extracted and hauled for road management work will not be taken from salamander habitat. Performance requirements for other actions under the Stewardship Plan and contained in the BA, which constrain the use of heavy equipment in salamander habitat will also apply. Road management actions will be coordinated in advance through the annual consultation between the Trust and the Service and site specific best management practices may be developed to further protect the salamander and its habitat.

Watershed Restoration

Activities such as planting, placing sod, erecting fences or barriers, placing structures to reduce the energy flow, removal of manmade impoundments with heavy equipment will be used to restore previously diverted stream courses, to address localized erosion in riparian or upland environments.

Erosion Control

Activities other than road maintenance to prevent, control, or halt erosion may include the rehabilitation of other existing infrastructure features such as well pads, log landing or livestock gathering areas. Rehabilitation of these localized features will generally include erosion control (placement of logs, rocks, or man-made features to halt erosion), construction of contours or placement of culverts to provide drainage, or soil scarification to promote the establishment of native grasses.

Noxious Weed Control

Noxious weed control involves the eradication of noxious weeds using mechanical or biological methods, or herbicides. Noxious weeds are legally defined as any plant designated by a federal, state, or county government to be injurious to public health, agriculture, recreation, wildlife, or any public or private property (Sheley and Petroff 1999). All ecosystems (rangelands, forests,

grasslands, riparian areas, wetlands, lakes, and streams) are vulnerable to invasion by non-native weed species. The State of New Mexico maintains a list of species considered noxious in the state. The list places a weed designated as noxious into one of three categories for treatment:

- Class A species are currently not present in New Mexico, or have limited distribution. Preventing infestations of these species and eradicating existing infestations is the highest priority.
- Class B species are currently limited to portions of the state. In areas with severe infestations, management should be designed to contain the infestation and stop any further spread.
- Class C species are widespread in the state. Management decisions for these species should be determined at the local level, based on feasibility of control and level of infestation.

Currently the trust is actively eradicating weeds occurring on the preserve deemed noxious in the state of New Mexico including:

- Canada thistle (*Cirsium arvense*) (Figure 17, left) a Class A noxious weed,
- Bull thistle (*Cirsium vulgare*) a Class C noxious weed,
- Musk thistle (*Carduus Nutans*) (Figure 17, center) a class B noxious weed,
- Oxeye daisy *(Leucanthemum vulgare)* (Figure 17, right), a Class A noxious weed.

Canada and bull thistle as well as oxeye daisy are being treated annually with an herbicide, Clopyralid, (Transline™). Musk thistle is primarily treated by digging up the plant and removing the seed heads.

The Trust is proposing to continue current efforts to eradicate these weeds as well as implementing a long-term strategy to prevent, control, and eradicate noxious weeds. Under this long-term strategy you propose to continue current eradication efforts and will begin immediate and aggressive control and eradication of known populations of Cheatgrass *(Bromus tectorum),* shown left in, using Glyphosate (Roundup™), Imazipic (Plateau™), or the combination of both (Journey™) to control cheatgrass.

The Trust is also proposing to implement a strategy of early detection, rapid response (EDRR) to prevent, control, and/or eradicate any weeds found on the preserve in the future. The EDRR strategy will allow treatment of invasive plant infestations located outside of currently identified treatment areas. Infestations outside of existing treatment areas may include sites and species that currently exist on the preserve but have not been located during previous inventories, or new sites and species that arise in the future. For example, Dalmatian toadflax (*Linaria dalmatica*) and Yellow toadflax (*Linaria vulgaris*) (Figure 18, center and right) are known threats from surrounding areas that will be treated under these rules if they were discovered on the preserve.

The intent of EDRR is to allow timely control, so that new infestations can be treated when they are small in order to control their spread, minimize treatment costs, and reduce adverse effects of

treatment. EDRR will improve your ability to eradicate new invasive plant species and keep areas currently without infestations noxious weed-free. Newly discovered sites considered for treatment under EDRR must meet certain requirements. They will be reviewed prior to treatment to determine if environmental impacts and treatments will be consistent with those analyzed and disclosed in the LRMP EIS. All of the following requirements must be met in order for new sites to be treated through EDRR:

- The species at the site must be a plant meeting the definition of "noxious weed" and be on the list of species identified as noxious in the state of New Mexico. You are *not* proposing to eradicate all non-native plants, only those classified as "noxious weeds". An exception is regarding goatheads (*Tribulus terrestris)* which have been sighted on the preserve. Goatheads are an exotic, invasive, and generally miserable plant although not classified as noxious by the state of New Mexico. Goatheads will be aggressively eradicated by digging or pulling in combination with the application of Glyphosphate.
- The control is consistent with your plan.

Proposed Treatment Methods for Invasive Species

Once prioritized and assigned treatment objectives, noxious weed populations will be treated (i.e. either eradicated, confined or controlled). Selected treatment methods will be based on the experience of staff, invasive plant control experts from local agencies, and herbicide labels, (Bossard, Randall and Hoshovsky 2000, Sheley and Petroff 1999). No single management technique is perfect for all invasive plant control situations therefore more than one option is listed for each species where available. Treatments may be used in combination, or change over time as sites become smaller and less dense. You propose to follow the decision-making process outlined in the appendices which focuses on site specific factors and on incorporating an integrated weed management approach in order to achieve effective and practical treatment at each site.

Physical control methods include manual hand-pulling, the use of hand tools, power tools, prescribed fire, mulching, mowing, and solarization. Biological control, within the context of this analysis, involves the use of animals or vegetation to consume or out-compete undesirable plant species. Grazing can be used to selectively control or suppress weed growth, but may also spread certain invaders. The use of desirable or innocuous plants, especially natives, to out-compete alien species is an important consideration in any weed treatment effort and may be used to enhance other types of control measures.
Chemical control is conducted with herbicides that kill or inhibit plant growth and will be used to eliminate the target species. Different herbicides will be selected based on the site specific factors including:

- Stages of plant growth;
- Preventing herbicide resistance;
- Sensitive plants, riparian areas, open water, or human uses that may be present or occur at a site-specific area.

As previously described the continued use of Clopyralid (Transline), authorized under the 2003 decision, is proposed in this analysis. Three additional herbicides are also proposed for use as noxious weed treatments on the preserve. They are: Glyphosate (Roundup), Imazapic (Plateau), and Imazapic+Glyphosate (Journey).

Increased inventories have located noxious weed occurrences that were previously unknown. The weed populations occur as individual plants or several plants. In 2012, about 40 individual locations were treated. However, comprehensive mapping efforts have not been conducted and the true extent of invasive species has not been quantified. If existing occurrence size turns out to have been underestimated, if treatment needs increase in response to vegetation treatments, or if emergencies arise in the future (such as response to post- fire invasion) it could be necessary to be able to treat significant areas of the preserve.

Combined herbicide treatments from within existing sites and as a result of EDRR will not exceed 1,139 acres per year (~1.28% of the Preserve's area) during the life of the proposed action (there are currently treat 40 point locations of individual plants and groups of plants.). This upper limit is a "cap" derived from considering acres treated in recent years, potential increases in treatment acres resulting from recently discovered weed populations, and potential "worst case" needs based on a comprehensive inventory of high risk locations (such as roadsides and gravel pits). Realistically, it is expected that actual treatment will be much less than 1,139 acres per year. Herbicides will not be used in every instance of treatment, existing weed populations likely cover far less than 1,139 acres, and performance requirements are expected to prevent noxious weeds from achieving this extent. In general relatively small spot treatments similar to historic herbicide application on the preserve are expected. Nonetheless, it is prudent to plan for unforeseen circumstances so that adaptive management of the preserve can be used. If this cap proves to be inadequate in the future, additional environmental analysis will be required to implement a decision to treat additional areas.

Site Restoration

Commonly used control methods, such as manual or herbicide treatments may eliminate or suppress invasive species in the short term, but the resulting gaps in vegetation and bare soil create open niches that are susceptible to further invasion by the same or other undesirable plant species. Site restoration or revegetation is an important part of any strategy to reduce invasive plants. The first step is to determine the need for active restoration/revegetation versus passive restoration.

Passive restoration depends on re-colonization from the existing native plant seedbank and from seed dispersed from surrounding sources, as well as growth and reproduction of native species already within the treatment site. Passive restoration is appropriate on sites where relatively little bare ground exists after treatment. Active restoration requires activities such as seeding, raking (by hand or with a harrow pulled by an ATV), mulching, and/or planting native plants. Active

restoration will likely be limited to large sites with dense infestations, where considerable bare soil and little native vegetation are present after treatment. None of these areas presently exist. Passive restoration will be the preferred option at known noxious weed locations within the preserve due to their relatively small size and the fact that they are within or adjacent to native plant communities capable of providing seeds for recolonization. Many of the sites have low-density infestations, and growth and reproduction of existing native plants should be sufficient to revegetate the sites. Sites where continual disturbance prevents long-term establishment of vegetation (such as parking areas, and gravel pits) will not be actively restored. Foreseeable active management opportunities will include recently disturbed landings and skid trails where restoration will be used as a preventative measure to reduce bare soil, or on roadsides where restoration seeding could be used to vegetate recently treated areas. Active restoration opportunities such as planting or seeding of native species will be implemented on a site specific (project by project/treatment by treatment) basis as they are identified in the future, and according to the principles of adaptive management.

The long-term strategy for prevention and control focuses on reducing the establishment of new noxious weeds or spread of existing weeds. Initially you plan to focus on known occurrences and features such as roads, aggregate sources, mechanical treatment sites, grazing infrastructure and open roads. Additional inventories may correlate other locations or activities as high risk.

Research, Inventory, Monitoring, and Evaluation

This action involves measuring structure, composition, and function of various ecosystems at various scales including collecting samples using non-destructive[8] and destructive methods, establishing temporary and permanent instrumentation and/or exclosures, and providing temporary and/ or limited administrative access. Priorities will be to:

- Install permanent water quality and climate instrumentation, and permanent sites and exclosures for long-term monitoring;
- Collect baseline information for LRMP activities.
- Evaluate and compile the results of LRMP activities.
- Maintenance of existing monitoring instrumentation and exclosures.
- Landscape scale baseline data on wildlife including, New Mexico meadow jumping mouse and large predators.

Extramural research and inventory (not directly associated with ongoing management activities or long-term monitoring; generally in support to an external project) would be second priority.

Jemez Mountains Salamander Conservation Measures

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[8] Nondestructive sampling: measuring an element such as vegetation, in situ and leaving it intact. Capturing animals and taking measures, attaching collars or transmitters and releasing the animals is non-destructive.

Destructive sampling: Generally refers to any action where the element is removed or destroyed and cannot be re-measured. Cutting down snags, capturing and killing or removing animals, removing plants are all destructive methods of sampling.

In the final BA, you identified key issues or impact areas related to salamander habitat that are known to, or likely to, result from forest thinning and prescribed burning. The following Table 8 is excerpted from the final BA and describes the issue/impact and how you are addressing the issue in your proposed action. Response measures in Table 8 are your commitments to performance requirements and Best Management Practices (BMPs) and monitoring that will be undertaken during restoration activities (e.g., monitoring soil moisture and temperature, abundance of invertebrate prey species, preservation of prime microhabitats). You also provided an Appendix with a description of microhabitat assessment design and operation. While BMPs are still in the development phase, the Trust will adopt all BMPs in draft form as they develop, and will work closely with experts in this field to ensure that functional best management practices are followed during restoration work. All listed Response and Performance Measures, BMPs, and microhabitat assessment work are considered Conservation Measures for the salamander that you are including as part of your action.

Table 8 - Key issues related to Jemez Mountains salamander populations and critical habitat

Issues (* Indicates Key Issue)	Issue Statement	Response measures
Habitats & Biodiversity		
*Jemez Mountain Salamander habitat – structural microhabitat.	Downed logs provide essential habitat for the Jemez Mountains Salamander and many other animals. Restoration treatments provide opportunities to protect these features and to increase overall habitat heterogeneity and biodiversity. Conversely, these features are susceptible to destruction from restoration treatments, especially fire.	– Performance requirements to preserve existing logs; add large logs to forest floor habitat. – Adaptive management, including actions to prevent combustion of existing logs during prescribed fire.
*Jemez Mountain Salamander habitat – microclimate.	Reducing forest density is critical to reducing fire severity and thus protecting the habitat of the Jemez Mountains Salamander from loss and adverse impacts that would result from severe burning. The more open forest can also improve the capture and storage of water (watershed function). Conversely, the more open conditions could allow for increased drying during the summer months. There is uncertainty as to the net impact on moisture regimes within microhabitat.	– Performance requirements to maximize capture of snow water in spring to increase soil moisture. – Adaptive management, monitoring changes in soil moisture in microhabitats (beneath logs and rocks) during and after restoration treatments.
*Jemez Mountain Salamander habitat – food resources.	Changing forest structure may have direct effects on the abundances of	– Performance requirements to ensure

	primary invertebrate food resources of the Jemez Mountains salamander (e.g., ants, mites, and other small species).	sufficient woody materials remain for both salamander microhabitat and invertebrate habitat. – Adaptive management: Monitor for changes in ground-dwelling invertebrates before, during and after forest restoration actions.
*Jemez Mountains Salamander populations – direct mortality during mechanical treatments.	The use of wheeled or tracked machinery during forest thinning operations has the potential to kill individuals in a site's population if the vehicles crush logs, stumps or rock piles that are harboring individual salamanders.	– Performance requirements to avoid disrupting existing down logs and stumps; avoid disturbing rock piles or larger individual rocks. – Adaptive management: Monitor activities before, during and after restoration operations to ensure prime microhabitats are not disturbed. – Use of heavy equipment/ground disturbing activities will be avoided or minimized, and conducted outside of the summer monsoon timeframe
*Jemez Mountains Salamander populations – direct mortality during prescribed fires.	Prescribed surface fires following forest thinning may kill salamanders directly if salamander-inhabited log or stump microhabitats are burned; even sub-lithic habitats may become inhospitable if large fuel levels are burned above them.	– Performance requirements to conduct prescribed fires during periods when salamanders are likely to be below ground (e.g., late fall, winter, early spring); preserve prime microhabitats from burning (e.g., do not burn existing logs and stumps). – Adaptive management: Monitor fire impacts on logs and stumps, including sub-soil temperatures beneath rocks, logs and stumps.

The following Table 9 lists all your performance requirements as they relate to specific PCEs.

Table 9 – Performance requirements specific to Salamander Critical Habitat

Primary Critical Element	Activity	Mitigation	Potential Impact on PCEs and salamander populations
All	Monitoring	• Sites within and/or representative of salamander critical habitat that include PCEs shall be established to monitor the effects of thinning on soil moisture and evaluate the effectiveness of mitigating/conservation measures.	• No negative impact on PCE or individuals; data from monitoring to provide levels and directions of soil temperature and moisture changes with forest treatments.
All	Reporting	• Acres treated by activity and prescription within critical habitat shall be reported to the Service annually • Monitored outcomes within critical habitat shall be reported to the Service as available.	• Not applicable.
Canopy cover, shading	Forest thinning prescription	• Cutting of large[9] and old trees (characteristic bark and crown) or snags is limited to hazard trees (public safety, protection of roads, buildings, utilities) If a large tree is cut for these reasons, at minimum 12 feet (measured from the large end) will be left in the woods for habitat. • 50 percent total tree/shrub canopy cover will be retained when thinning in critical habitat.	• Removal of canopy may have temporary effect of warming/drying formerly shaded ground area, until canopy reforms. Addition of log sections will provide additional PCE in local area. • This level of canopy will provide for increased soil moisture from snowmelt in spring (see references above), while reducing threat to PCEs from stand-replacement fire. Impact of canopy reduction on

[9] "Large" is a measure of tree diameter. This EIS defines a large tree (standing live or dead) as having a diameter greater than 16" when measured 4.5 feet above the ground on the uphill side (diameter at breast height or dbh); a large log is defined as having a diameter greater than or equal to 12 in. measured at the large end.

Primary Critical Element	Activity	Mitigation	Potential Impact on PCEs and salamander populations
			soil moisture/temperature is uncertain, but may lower moisture and increase warmth in summer in some patches with PCEs, inducing salamander individuals to move to adjacent moister, cooler microhabitats.
Species composition	Forest thinning prescription	• Mixed tree species will be retained.	• Trees of different species have different structures, influencing shade characteristics and salamander microhabitats; tree trunks may provide different quality microhabitats due to different decomposition patterns (e.g., salamander may prefer Douglas fir logs). Maintaining species mixes on sites, with preference for Douglas fir trees, will benefit PCEs.
Ground surface cover	Biomass disposal	• Removal combined with mastication will be the preferred method of biomass treatment; lop and scatter will be the alternative method (with or without removal). • Average depth of mastication will be less than 4 in.; less than 50 tons/acres. • A portion of coniferous logs at least 12 in. in diameter at the large end felled during thinning, particularly Douglas fir will be left on site (min. of 2/ acre). • Existing logs at least 12 in. diameter at the large end	• As large existing logs will be left in place, the addition of more logs on the ground should increase the microsites for salamander and benefit PCEs. • Mastication effects are unknown on salamander behavior, but mastication will increase soil moisture, benefiting PCEs. If masticated materials impede movements or decrease invertebrate prey species, salamander individuals may be

Primary Critical Element	Activity	Mitigation	Potential Impact on PCEs and salamander populations
		which are in contact with the soil in varying stages of decay from freshly fallen to nearly fully decomposed will be left on site.	induced to move to more favorable microsites. Monitoring of microenvironment and prey species will inform this issue.

Finally, you are including the following measures into your proposed action for the protection of the salamander, its habitat, and designated critical habitat:

- Best Management Practices (BMPs) for the protection salamander and critical habitat PCEs are being collaboratively developed between the New Mexico Department of Game and Fish, The Nature Conservancy, the US Fish and Wildlife Service, and the Valles Caldera Trust. Once finalized, these practices shall be incorporated as performance requirements; in the meantime, you will follow all draft BMPs as they develop in consultation with salamander expert scientists.
- Suitable habitat for salamander shall be considered occupied for the purpose of implementing performance requirements.
- Prescriptions shall emphasize the retention of large[10] and old trees (characteristic bark and crown). Large trees can only be cut if their presence would negatively impact future health and vigor due to genetics or host status (poorly formed, fire intolerant, diseased, mistletoe infected, insects); or the location presents a threat to facilities or public safety (hazard trees).
    - Large trees may be designated for cutting in prescriptions, but all such trees must be marked with paint or other impervious method for removal.
- Prescriptions shall emphasize the retention of large snags, down logs, and stumps. A large snag can only be cut if it presents a threat to facilities, or to public or worker safety (hazard trees), or would contribute to control problems during prescribed fire activities. If a large snag is cut for the above reasons, it shall be retained as large down log.
- Prescriptions shall be modified within critical habitat to maintain shading and protect PCEs by keeping canopy coverage at $\geq$ 50%.
- Mechanical and prescribed fire treatments can be implemented in two entries in significantly departed forests based on soils to reduce the intensity of impacts.
- When feasible, use of heavy equipment/ground disturbing activities will be avoided or minimized, and conducted outside of the summer monsoon timeframe.
- Prescribed burn plans shall include the following to protect large down woody debris including stumps and snags:

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[10] "Large" is a measure of tree diameter. This EIS defines a large tree (standing live or dead) as having a diameter greater than 16 in. when measured 4.5 feet above the ground on the uphill side (diameter at breast height or dbh); a large log is defined as having a diameter greater than or equal to 12 in. measured at the large end.

- Prescription parameters that minimize consumption of large down woody debris.
- Lighting techniques that reduce the ignition of large down woody debris and snags.
- Pre-burn treatments such as removing concentrations of fuel surrounding large woody debris and snags.
- Pile burning shall be curtailed when salamanders could be directly impacted, i.e., piles are on likely salamander locations, within suitable habitat, conditions are saturated and salamanders could be active (spring, summer, or early fall).

Action Area

The action area includes all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action [50 CFR § 402.02]. The action area includes the entire Valles Caldera National Preserve, an 88,900 acre unit of National Forest System land located in north-central New Mexico.

STATUS OF THE SPECIES AND CRITICAL HABITAT

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 (*Acer glabrum*), 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 action area consist of the entire VCNP and thus approximately 23,746 ac (9,609 ha) of designated critical habitat are within the project area, with approximately 14,935 ac (6,044 ha) in Unit 1 and 8,811 ac (3,565 ha) in Unit 2.

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.

ENVIRONMENTAL BASELINE

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

Status of species within the action area

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 comprises a large proportion 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.

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 trees from the Jemez Mountains including throughout the action area, and 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 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.

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, 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.

The proposed action includes a suite of integrated actions to restore the resilience and adaptive capacity of the preserve's forest and grassland systems, protect and improve wildlife habitats, increase soil, riparian, and wetland resilience, reduce soil erosion, and restore watershed function. The proposed action overlaps with a significant portion of the range of the salamander, with the intention to restore natural systems to help improve natural systems to benefit all native wildlife and their habitat, including the Jemez Mountains salamander. While some warming and drying of habitat may result from forest restoration treatments, strategic management of how,

when, and where treatments occur will reduce some of the potential adverse effects and result in long-term beneficial effects by reducing the risk of severe adverse effects that result from large-scale, stand-replacing wildfire. Furthermore, the salamander is a fire-adapted species, in that it has evolved with fire over time, and reintroducing fire, and bringing a more naturalistic fire regime back into the system is also expected to have long-term benefits to the salamander and its habitat.

In the long-term, the species should benefit from the action by reducing the risk of large scale, high-severity fire and restoring the forest to more natural conditions with which the species evolved. In general, direct effects of the action will be minimized because the salamander is active above ground for a small portion of the year during summer rains (typically July through September), and when feasible, work will be conducted outside of this season and work using heavy equipment will maximize the utilization of existing roads or frozen ground. We anticipate that direct effects to the species will be minimal over the time frame of the action and that the majority of effects to the species will be indirect, through changes in habitat.

In large part, long-term indirect effects of the proposed action on the salamander and its habitat are expected to be beneficial, as they are designed to restore the natural landscape, promote forest health, and ameliorate one of the main threats to the species' persistence: high-severity wildland fire. Wildland fire has resulted in damaged or destroyed habitat in forested areas, to which the total impacts are still not well understood. Some impacts, however, include warming and drying of the habitat that likely have severe behavioral and physiological adverse effects. Increases in soil and microhabitat temperatures, which generally correspond to burn severity, can have profound effects on salamander behavior and physiology and can, therefore, influence their ability to persist following severe wildland fires. For example, soil temperatures following high- and moderate severity can reach daily temperatures that exceed the thermal tolerance for the species (the temperature that causes death) (Spotila 1972; Cummer and Painter 2007). Because widespread dry conditions are an important factor contributing to the occurrence of severe wildfire, when severe wildfire occurs, most salamanders are likely protected in subterranean habitat and are not killed directly from wildfire. However, even in moderate and high-severity burned areas where fires did not result in the death of salamanders, the microhabitat conditions can limit the timing and duration that the salamanders can be active above ground for feeding and mating. Moreover, elevated temperatures lead to increases in oxygen consumption, heart rate, and metabolic rate, resulting in decreased body water (the percentage of water in the body) and body mass (Whitford 1968). Physiological stress from elevated temperatures may also increase susceptibility to disease and parasites. Because the data from this and other species of plethodontid salamanders indicate that warming and drying of habitat can alter behavior and physiologic function, which can then lead to expending more energy and prioritizing moisture requirements over feeding and mating, warming and drying of habitat can affect the ability of both, individuals and populations, to persist.

Indirect effects will be minimized though a concerted effort to protect salamander habitat from warming and drying and other adverse effects while implementing the proposed action and minimizing disturbance or alteration of the PCEs within critical habitat. To accomplish this, the

Trust will meet annually with the Service to discuss specific actions (treatments) for the upcoming year and to discuss past actions, data collected from previous years, and adaptive strategies. Not all activities will occur every year. Annual work plans will be a subset of the following actions. The proposed strategy and analysis of each type of action and conservation measures are analyzed below.

Effects of Forest Restoration Treatments

Approximately 21,500 acres will be mechanically treated throughout the life of the project. Nevertheless, treatments will be strategically staggered within suitable salamander habitat, critical habitat, and areas where greater densities of salamanders are known to occur, so that these areas can be adaptively managed using real-time information. Within designated critical habitat, treatments will focus on protecting and conserving the existing PCEs, as well as promoting future conditions where PCEs can be recruited and maintained to support the life history processes of the salamander into perpetuity. Additionally, it is not likely that all 21,500 acres proposed for treatment are occupied by the salamander; however, because there is not an accurate method to know which areas were historically occupied, presently occupied, to be occupied in the future, or are dispersal areas; all acres will be considered occupied and conservation measures put in place for maximum protection of the species and its habitat. Overall, this approach will err on the side of the species, will allow for monitoring of how treatments may affect factors important to salamanders, and will disperse any potential adverse effects to salamanders or their habitat over time and space.

All forest restoration treatments involve some reduction in the number of trees in the area, and creating a more open canopy. The effects to salamander habitat and the salamander from reducing canopy closure are not entirely understood. However, based on Parmenter (2009), Veatch et al. (2009), Gustafson et al. (2010), and Harpold et al. (2013), the VCNP provided the following analysis of how some forest management practices may improve the soil moisture relationships on the forest floor. During winter, a closed forest canopy will intercept much of the falling snow in the upper branches of trees, which is subjected to intense sublimation (direct loss of snow water to the atmosphere). Estimates of total winter snow water loss in the Jemez Mountains are approximately 50 percent. Under a closed forest canopy, forest soils will have less recharge (infiltration) as the snow melts, leaving the soils relatively dry until the summer monsoons arrive. In contrast, if the forest canopy is thinned or burned to 25-40 percent canopy closure, a much larger proportion of the snow falls to the ground, and the remaining trees provide shade from the sun and protection from high winds. Measurements of snowpack in the Jemez Mountains have shown that in forest openings, areas on the north side of trees (shaded) have 26% more snow accumulation than completely open areas without trees and 30% more snow than beneath dense forest canopies. Similarly, large open areas on the south side of forest edges have 46% less snow than the forests themselves. The optimal forest canopy for maximizing snow water equivalent retention through the winter is approximately 25-40% canopy cover (see Parmenter (2009), Veatch et al. (2009), Gustafson et al. (2010), and Harpold et al. (2013) for details). A 25-40% canopy cover allows snowfall to reach the ground and also provides sufficient shade and wind protection. In addition, the 25-40% canopy provides enough shade cover to avoid open south-facing exposures (i.e., the shade of the trees during winter low-sun-

angles extends across the entire opening to the trees on the other side of the open patch, effectively shading the entire opening). As a result, a much larger amount of water is available during spring snowmelt for recharging soils. While the data support that 25-40% canopy cover maximizes snow water equivalent retention and maximizes soil moisture, there is still some uncertainty regarding the optimal canopy closure for salamanders. It is anticipated that salamanders will benefit from maximizing snow water equivalent and soil moisture; however, canopy closure also affects microhabitat temperatures, which is also an important aspect of how salamander habitat may change as a result of treatments. Mechanical restoration treatments generally include guidelines to reduce canopy closure to 30-60 percent over a landscape area and mechanical wildland fire control treatments include guidelines to reduce canopy closure to 30-50% in localized areas. However, the Trust will maintain 50% canopy closure for all treatments in all forest types in designated critical habitat, and restoration treatment prescriptions are not proposed in mesic mixed conifer forest types (areas most likely to have greater numbers of salamanders). Therefore, it is anticipated that the treatments that reduce canopy closure to 50% will improve salamander habitat by increasing soil moisture while maintaining moderate canopy closure in occupied critical habitat and mesic mixed conifer forest types that will continue to moderate temperatures through shading.

Elevated soil moisture following snow-melt should provide improved salamander habitat conditions into early summer, reducing the time of low moisture availability between snow-melt and the onset of the monsoons. However because there remains uncertainly how specific treatments may change conditions in salamander habitat, and thus salamanders, a series of moisture and temperature instruments will be installed to assess salamander microhabitat. Consisting of four locations, two will be in control areas that will not undergo thinning or burning for 5 years, and two will be in areas that will be thinned and burned in a managed fire (Appendix B, Final BA). It is anticipated that each of the four sites will consist of 15 probes that will measure temperature and soil moisture at varying depths around an "optimally" decomposed Douglas fir log that is typical for salamander microhabitat use. Additionally, pitfall traps will be used to sample surface-active invertebrates to assess the potential impacts of treatment on invertebrate prey. The pitfall traps will likely be placed in an area that is considered salamander habitat, but outside of critical habitat, and spatially paired with a control area. The pitfall traps placed in treatment areas will likely be treated with both mastication and prescribed fire to assess the treatments with the most uncertainty on potential indirect effects to salamanders. Finally, mechanical treatments will retain all existing "old wood" stumps and logs as important habitat features and will also increase log availability for salamanders in the future by selectively cutting hazard trees, but not removing them from the forest floor.

Mechanical Treatment may include any of the following specific activities in any of the subsequent ecotypes. The use of heavy equipment for cutting trees, yarding (using cables to pull partially or fully suspended logs or trees) or skidding (using heavy equipment to drag or carry logs or trees) from forest to landing site for removal or masticating of trees. Existing roads will be used for heavy equipment when possible. Use of heavy equipment in salamander habitat can crush, injure or kill individuals if conducted when salamanders are active above ground. Additionally, if conducted when there is no snow on the ground or the ground is not frozen, the

heavy equipment can compact soil and affect subterranean habitat or interstitial spaces. BMPs for the salamander include seasonal restrictions that limit the use of heavy equipment in occupied areas when salamanders may be surface active and restrict heavy equipment use in undisturbed salamander habitat to times when the ground is frozen or utilizing special equipment to prevent soil compaction. Heavy equipment use on existing road beds may occur throughout the year. Preventing soil compaction is important because Jemez Mountains salamanders do not dig well, and utilize existing tunnels and burrows to move between above and below ground habitat. Use of heavy equipment or actions that involve ground disturbing activities will be avoided or curtailed to the maximum extent practical in salamander habitat and designated critical habitat for the salamander. Performance requirements and conservation measures are included as part of the action, specifically to protect salamanders and their habitat. These include: implementing seasonal restrictions; avoiding disrupting existing down logs and stumps; avoiding disturbing rock piles or larger individual rocks; and avoiding disrupting specific PCEs with heavy equipment (e.g., structural features, such as rocks, bark, and moss mats that provide the species with food and cover, underground habitat in forest or meadow areas containing interstitial spaces provided by igneous rock with fractures or loose rocky soils; rotted tree root channels; or burrows of rodents or large invertebrates). These measures will greatly reduce both direct and indirect effects to salamanders and designated critical habitat from the use of heavy equipment. However, some short-term, occasional negative impacts may occur despite the conservation measures. To further reduce the potential for adverse effects to the salamander and its habitat, monitoring will be conducted before, during, and after restoration operations to ensure suitable microhabitats are not disturbed.

Other smaller scale actions that may occur with mechanical treatments include cutting trees with a chainsaw, lopping off and piling or spreading tops and branches of trees, removal as firewood by individuals with pickups, stockpiling logs or slash for removal or disposal (burning or chipping), constructing fenced exclosures to protect restored areas from impacts by elk or livestock, and camping by crews or contractors. Best management practices include seasonal restrictions to avoid actions when salamanders are active above ground (during summer rains approximately from mid-July through to the end of September/early October), requiring the use of existing roads only for vehicles (e.g. pickup trucks or other vehicles picking up fuel wood must stay on existing roads), and not allowing downed Douglas fir to be removed as fuelwood. These measures will nearly eliminate any potential adverse effects to the salamander and its habitat.

With any mechanical treatment there is an associated decision on how to dispose of the cut biomass. There are five possible methods of biomass disposal: utilization, mastication, hand piling, and prescribed fire. Utilization removes the biomass from treatment areas for a variety of uses including firewood, latillas, posts and poles, or small dimensional lumber. The utilization biomass can also be chipped for use in landscaping or to fuel burners for heat or energy. Biomass utilization could have a greater impact on salamanders and their habitat than some other biomass disposal options because it is more invasive in terms of personnel and people in the area and vehicle and machinery use. Conservation measures and performance requirements that will reduce impacts to salamanders, its habitat, and designated critical habitat PCEs include seasonal restrictions to avoid impacting salamanders when surface active (this includes the treatment work

and the entry to remove the biomass), limiting equipment use to slopes less than 30% (all planned mechanical treatment units have an average slope of less than 25%), limiting equipment use to dry or frozen ground and curtailed when conditions are saturated (spring thaw, summer monsoons, soaking rain in any season), requiring vehicles to stay on existing roads, preferentially leaving Douglas fir trees, and other requirements to avoid PCEs and to create new PCEs. Adverse effects include ground disturbance or compaction from heavy equipment, but will be greatly minimized by limiting equipment use to frozen or snow covered ground particularly in areas where salamanders are more likely to occur and in critical habitat. Limited use of heavy equipment in areas where the salamander is less likely to occur may occur when conditions are dry.

Mastication biomass material is created through thinning and can result in either a heterogeneous shredded material or a uniform chipped material. The mastication material may be removed (by moving biomass to a road or landing point) or left on site and distributed throughout the treatment area. Performance requirements, conservation measures, and BMPs should eliminate most direct effects to salamanders by operating when salamanders are not active above ground (seasonal restrictions), and indirect effects to possible soil compaction by utilizing existing disturbed areas (existing roads, well pads, etc) and frozen or snow covered ground for heavy machinery to reduce potential impacts resulting from using mastication machinery in salamander habitat.

Of greater concern and uncertainty are the impacts that may result from the masticated material left in place. In a 2011 issue of Fire Science Brief (Joint Fire Science Program, August 2011) a study that specifically targeted the effects on fuel loading, vegetation response, tree regeneration, soil microclimate and soil nitrogen, and carbon storage was summarized. In that study, general results were that mulching was well distributed, moisture levels increased, and there were few negative impacts at the operational level (Fire Science Brief August 2011). However, this study assessed effects at an "operational level" (or stand level) where they also report findings that across the stand the distribution and dispersal of masticated materials were patchy, resulting in mixed depths and thus mixed vegetation response and that treatments cannot be generalized across western conifer forest ecosystems (Battaglia et al. 06-3-2-26). Still, information from this study suggests that mastication, and the depth of masticated materials has the potential to influence the regeneration of trees in salamander habitat. Others report how Douglas-fir seedlings respond to or are affected by wood chips is variable (Zabowski *et al.* 2000; Roberts *et al.* 2005). The thickness of the masticated material can thus influence understory vegetation regeneration, tree regeneration, and tree seedling growth and success. Battaglia et al. (06-3-2-26) specifically state that there is a physical barrier posed by mulch, and that it may affect plant regeneration in species with certain traits (e.g., annuals, small-seeded species). This is particularly relevant to treatments in salamander habitat because if an area receives a distribution of masticated material such that a physical barrier is formed that impedes the growth of understory vegetation, tree regeneration, or seedling growth, it likely would impede the movement of salamanders from below ground habitat to above ground habitat. Furthermore, continuous recruitment of Douglas fir trees may be important to the long-term persistence of Jemez Mountains salamanders because Douglas fir trees provide an important component of above ground habitat, especially in the context of increased warming and drying conditions resulting from climate change, because decomposing

Douglas fir logs provide high-moisture retreats that stay wetter and cooler relative to other above ground cover objects.

The Trust is proposing to monitor activities at a finer resolution than other studies to relate impacts from mastication and wildland fire use in areas that have received mastication treatments more specifically to the salamander its habitat. The depth of masticated materials is directly related to the amount of biomass removed from the forest, and should initially be implemented with a conservative approach.

Additional information reported by Battaglia et al. (06-3-2-26) relates to soil nitrogen, in the forms of ammonium and nitrite, and report that mulching had a significant effect (3 fold increase) in soil nitrate. As articulated by Butterbach-Bahl et al. (2001), "Nitrogen cycling in terrestrial ecosystems is complex and includes microbial processes such as mineralization, nitrification and denitrification, plant physiological processes (e.g. nitrogen uptake and assimilation) and physicochemical processes (leaching, volatilization)." Because the Jemez Mountains salamander has great physiological contact with its environment and amphibians in general may be susceptible to adverse effects from exposure to nitrate (Lannoo, 2005) this potential effect of mastication on soil nitrite has the potential to be adverse to the salamander; however, the specific effects of changes in soil ammonium and nitrite resulting from mulching to salamanders is completely unknown and warrants further investigation prior to conducting mastication on a large scale in salamander habitat.

Additional alterations to salamander habitat resulting mastication are likely to include changes to soil moisture and soil temperature. While Battaglia et al. (06-3-2-26) report that mulch additions reduced soil temperature in the summer months and increased soil temperatures in the winter months, no soil or moisture data were collected for mixed conifer forests. However, we would expect that similar effects to soil moisture and temperatures would also be similar in mixed conifer forests. We anticipate that effects from masticated materials would be beneficial to the salamander in summer months, ameliorating some of the warming and drying in the Jemez Mountains associated with climate change; however, because we do not know the depth of salamanders in winter, nor their winter life history, the effects of potential warming of soil temperature in the winter remain unknown.

Because there is great deal of uncertainty regarding how various factors of mastication may impact the salamander and its habitat, we will work with the Trust to develop conservative strategies in applying mastication treatments in salamander habitat, and opportunities to collect data and research potential impacts or benefits to the salamander and its habitat resulting from mastication treatments.

Biomass material that is hand piled or lopped and scattered may be created with targets to reduce or break up concentrations of fuel for subsequent burning under low risk conditions, but can have different effects from subsequent burning. The proposed action indicates that hand piling is the least preferred method of biomass disposal, but that there may be a need for it in certain circumstances. For example, this method would be limited to areas near buildings or other features where mastication or broadcast burning is not feasible. The piling itself would be

expected to have minor direct effect to salamanders or critical habitat; however, it is possible that if conducted in salamander habitat and the piles are not burned right away, salamanders could begin to utilize the piles as habitat. Furthermore, burning can concentrate the downward flux of heat over an extended duration. The limited application of this biomass disposal method along with performance requirements that limit the size of material to be piled and the location of piles would reduce the potential for indirect effects from pile burning during prescribed fire. However the piles also present a hazard in the event of an unplanned ignition if prescribed burning opportunities are not available soon after piling. If burning is not accomplished within a few years then the loss of fine fuels requires drier conditions for burning acerbating the potential for localized severe burning. Lopping and scattering is most likely to be implemented on steeper slopes where biomass is not accessible for mastication. Lopping and scattering itself is not expected to have any measurable adverse effects to the salamander or its habitat, and it is believed that that the lopped and scattered fuel beds create an optimal ratio of surface area to volume ratio to support combustion and efficient burning. Because salamanders evolved in a fire adapted ecosystem, it is unlikely that the lopping, scattering, and prescribed fire will have any significant adverse effects. However, the relative importance to salamanders regarding of the time of year when fires burn is completely unknown, but discussed further under the following prescribed fire section.

Mechanical Treatment – Prescriptions by Ecotype

Fire Regime I - Ponderosa Pine Woodland and Savanna, Dry Mixed Conifer

This prescription leaves the largest and healthiest trees in groups with 10-20 feet between tree canopies and 25-50 feet between groups of trees. Tree clump/groups sizes can vary but generally are .2 - 1 acre in size, with between 5 and 30 trees per clump. On the preserve, where trees are often of similar sizes over large areas, the groups are not always visibly discernable. Groups of trees can vary in density. Larger trees may have interlocking crowns whereas younger trees are left more open to promote growth. Where Douglas-fir is present in the composition a group may have two canopy layers. Areas of closed canopy are left to provide cover mainly on slopes and in rocky areas.

The largest and most vigorous ponderosa pine and Douglas-fir as well as inclusions of aspen would be favored for retention. Based on field-sampled data, white fir and ponderosa pine would be targeted for removal; the majority of the white fir trees are under 7 in. diameter. While salamanders do occupy this forest type, it is not typically considered high-quality salamander habitat because it is generally warmer and drier than other forest types, and it is generally not within critical habitat, but the restoration actions will significantly reduce the risk of high-severity, stand-replacement wildfire, thereby reducing the risk of landscape-level fires carrying into high-quality habitats. As described above, it is anticipated that a reduction of forest canopy will generally increase soil moisture from spring snowmelt. In addition, mechanical treatments will leave all existing "old wood" stumps and logs, and will increase log availability by leaving additional logs from cutting of hazard trees. Because of seasonal restrictions and other implemented conservation measures previously discussed, potential direct effects to the salamander will greatly reduced, and less likely because this forest type is not considered to be

high-quality, nor expected to contain areas with high densities of salamanders. After forest thinning by mechanical treatments, it is anticipated that overall, soil moisture will increase; however, some areas of habitat may experience periods of increased warmth and dryness which may restrict salamander activities and micro-distributions. Furthermore, because one goal of the restoration project is to break up the continuity of fuels across the landscape, such that, in the event of a wildfire, the fuels will not be continuous, and any unplanned, high severity fires will be smaller in scale than they would be otherwise. To help protect high-quality habitat where salamanders are more often encountered and in greater numbers, more fuels will be removed from lower-quality habitat than from higher-quality habitat. It is anticipated that by reducing the risk of high-severity wildfire the overall effect on habitat and salamander populations of will result in a net beneficial outcome for this species.

Fire Regime I - Montane Grasslands

A restoration prescription would be assigned where ponderosa pine ponderosa pine trees are encroaching into the grasslands. Prescriptions would retain small well-spaced groups (60-100 feet between groups) of the healthiest trees. Where blue spruce trees are encroaching, trees average from 7-9" in diameter. Blue spruce would be lightly thinned in an irregular pattern to reduce the susceptibility to wind throw and protect soils, while enhancing watershed function. This habitat is not typically considered high-quality salamander habitat and restoration in this habitat type is not within the designated critical habitat for the salamander. Only small encroaching conifer trees will be removed during restoration and, as in other mechanical treatments, existing "old wood" stumps and logs will be retained. Direct effects to salamanders will be avoided through seasonal restrictions on use of machinery. Mature tree canopy coverage will be unaffected, and soil moisture should remain unchanged. Overall for mechanical treatments in this habitat, we expect than indirect effects to potential habitat to be insignificant and discountable.

Fire Regime III - Aspen and Mesic Mixed-Conifer

Forest health, aspen regeneration, and hazardous fuels reduction prescriptions will be assigned to these forests emphasizing the removal of ladder fuels, trees impacted by insects, trees with visible signs of damage or disease, and fire intolerant species (white fir, blue spruce, Engelmann spruce). Based on measures taken in the field, conifers, especially white fir and spruce, less than 9" in diameter will be targeted for removal. Some stands contain over 1,000 aspen trees per acre, most are under 5" in diameter. In these stands, the emphasis will be to remove overstory conifers that shade the aspen. The largest, most vigorous aspen, Douglas-fir, and ponderosa pine, will be favored for retention. Limber pine will also be retained to maximize the genetic variation in the species to protect it from white pine blister rust. Removal of trees (fuel load) to reduce stand stem density to approximately 150 trees per acre (30-60% canopy cover) will significantly reduce the risk of high-severity, stand-replacement wildfire, thereby preserving forest habitat for the salamander and preventing direct fire-related mortality.

Only some areas of this forest type of the VCNP are topographically suitable (low slope) for mechanical treatments; the rest will be restored using hand-crews. This forest type is generally considered high-quality habitat because it generally has more moist microhabitats, salamanders are more frequently encountered in this forest type, and when they are encountered, they seem to be at higher densities. As described above, it is anticipated that a reduction of forest canopy will generally increase soil moisture from spring snowmelt and mechanical treatments will leave all existing "old wood" stumps and logs, and will increase log availability by leaving additional logs from cutting of hazard trees. Soil monitoring will assess treatment effects to provide information to for use in adaptively managing and protecting salamander habitat and populations.

Moreover, this forest type will be targeted for particular assessment during annual meetings between the Trust and the Service to strategically design treatment locations (on a landscape scale) such that the continuity of fuels are broken up both within and surrounding this forest type, and that any known, localized, high salamander density areas are avoided. For these reasons, the majority of mechanical treatments in this forest type will be accomplished using hand crews, further reducing potential direct and indirect effects to the salamander and its habitat. After forest thinning by mechanical treatments, it is anticipated that overall, soil moisture will increase; however, some small pockets of habitat may experience periods of increased warmth and dryness that may restrict salamander activities and micro-distributions. Still, we anticipate that these pockets will be very small in scale because of the conservation measures. Furthermore, in the event of a wildfire, post-treatment fuels will not be continuous, and any unplanned, high severity fires will be smaller in scale. To help protect high-quality habitat where salamanders are more often encountered and in greater numbers, more fuels will be removed from lower-quality habitat than from higher-quality habitat. It is anticipated that by reducing the risk of high-severity wildfire across the landscape, breaking up the continuity of fuels around and within high-quality habitat, that the overall affect to habitat and salamander populations of will result in a net beneficial outcome for this species, even if some minor adverse effects are likely.

Fire Regime IV - Mesic and Dry Spruce-fir

Hazardous fuels reduction prescriptions would be used to reduce the potential intensity and severity of wildland fire across the landscape. Planned prescription parameters would select small, disease or damaged trees for removal. The largest, healthiest trees of all species would be favored for retention. Fuel-break prescriptions would be used strategically to improve the safety and effectiveness of wildland fire management. Based on measures taken in the field, trees targeted for removal would be white and subalpine fir less than 5" in diameter and Engelmann spruce less than 7" in diameter. Healthy Engelmann spruce, Douglas-fir, and aspen would be favored for retention. Removal of trees (fuel load) to reduce stand stem density to approximately 150 trees per acre (30-60% canopy cover) will significantly reduce the risk of high-severity, stand-replacement wildfire, thereby preserving forest habitat for the salamander and preventing direct fire-related mortality. Only some areas of this forest type of the VCNP are topographically suitable (low slope) for mechanical treatments; the rest will be restored using hand-crews. For these reasons in addition to the standard seasonal restrictions, and other

implemented conservation measures previously discussed, as well as the majority of mechanical treatments in this forest type will be implemented by hand crews, potential adverse direct and indirect effects to the salamander and its habitat will be greatly reduced.

Fire Regime III Mixed Montane Woodlands

Fire Regime III Mixed Montane Woodlands involves the removal of trees (fuel load) to reduce stand stem density to approximately 150 trees per acre with wildlife habitat improvement prescriptions to create patches and corridors of various size classes emphasizing the retention of mature shrubs and trees. Conifers less than 9" in diameter will be targeted for removal; healthy large conifers and oak trees and shrubs will be retained. Only some areas of this forest type of the VCNP are topographically suitable (low slope) for mechanical treatments; the rest will be restored using hand-crews. For these reasons in addition to the standard seasonal restrictions, and other implemented conservation measures previously discussed, as well as the majority of mechanical treatments in this forest type will be implemented by hand crews, potential adverse direct and indirect effects to the salamander and its habitat will be greatly reduced.

All Fire regimes/ecotypes - Hazardous Fuels Reduction on Steep Slopes

On steep slopes with a very high fire behavior potential, treatments may be implemented employing a hazardous fuels reduction prescription. This prescription focuses on removing ladder fuels (small trees, brush and slash) and breaking up the continuity of the fuels. Biomass is generally hand piled or lopped and scattered for later burning. Small tree yarding systems, which fully or partially suspend trees, could also be used. Affects to salamanders, its habitat, and designated critical habitat are discussed above, under various biomass removal techniques.

Summary of Mechanical Treatments

In summary, approximately 21,500 acres will be mechanically treated over the next 10 years. For prescription purposes, conservation measures will be applied to all treatments. These measures will maximize the protection of salamanders and minimize any potential adverse impacts to its habitat or designated critical habitat, even though we do not believe that all 21,500 acres are occupied by the species. A total of 15,165 acres of the 21,500 acres proposed for mechanical treatment are within designated critical habitat; however, 1,744 acres have been burned with high severity and will only receive contour felling for erosion control, and 2,073 acres were burned with moderate severity and are a lower priority for treatment, leaving approximately 11,348 acres for treatment in critical habitat (Table 4). Within designated critical habitat, the VCNP will focus on protecting and conserving the existing PCEs, as well as promote future conditions where PCEs can be recruited and maintained to support the life history processes of the salamander into perpetuity. Direct adverse effects to the species will be minimized through seasonal restrictions to avoid work when salamanders are surface active (July 1 through October 30; or as guided by most recent BMPs for the salamander). Despite the conservation measures some occasional direct effects may include crushing, killing, or injury if there are still occasional salamanders surface active outside the seasonal restrictions when

mechanical treatments occur. Indirect effects to the salamander will be reduced by reducing effects to the PCEs in designated critical habitat, and those same features in potential habitat (e.g. protecting decomposing logs, underground interstitial spaces, etc.). Utilizing existing roadbeds, implementing seasonal restrictions, and maximizing work when ground is frozen will reduce adverse impacts to salamander habitat components and PCEs that may result from the use of heavy equipment. The effects to the salamander and its habitat from reducing canopy closure are not entirely understood. It is anticipated that by implementing the restoration treatments that overall salamander habitat will become wetter resulting from fewer trees taking up water, and less canopy so more precipitation is able to reach the ground and infiltrate. However, the treatment may also result in some patchy areas where warming and drying of habitat occurs on a small scale. Additionally, as a conservative approach, more trees may be removed from areas generally considered to be lower quality salamander habitat with fewer salamander observations, in an effort to leave more trees (with greater canopy closure) in areas generally considered to have higher quality habitat with greater numbers of salamander observations. The purpose of this strategy is to better protect the species as a whole from large scale, high-severity wildfire by having a slightly more aggressive tree removal treatment in lower quality habitat, and a more cautionary, less aggressive tree removal treatment in higher quality habitat. While some treatments leave fewer trees and others leave more, all strategies are designed to reduce fuel loadings and maximize precipitation infiltration. If new research and information indicate that the salamander would benefit from removing more trees from high quality habitat, this approach could be modified during annual consultations. Overall, we anticipate that there may be some short-term, and small-scale negative impacts, but with long-term benefits for the salamander and its habitat.

Wildland Fire

Wildland fire includes the management of both planned and unplanned ignitions to achieve resource management and protection objectives and may be used, alone or in combination with any other biomass disposal method. You have proposed to use prescribed fire alone and in combination with mechanical treatments. Wildland fire management would be consistent with, but not necessarily imitative of, the fire regimes that have influenced the structure, composition, and function of the preserve's ecosystems prior to European settlement. Prescribed fire can affect the salamander, its habitat, and designated critical habitat by creating a downward flux of heat into the subterranean habitat and by consuming woody above ground habitat components or PCEs. Performance requirements intended to reduce the severity (consumption of duff, organic material and large woody debris, which relate to air quality, biodiversity, habitats, carbon etc.) include removal/utilization of boles, and modification of remaining slash by burning prescriptions, and use of specific lighting patterns (e.g. backing fires) can reduce impacts to be localized and short-term. While the application of prescribed fire is not precise and conditions can change during operations, measures will be in place and prescribed fires will be implemented to the best of your ability to achieve the desired objectives. Your objective of reducing the fire behavior potential at the landscape scale is expected to give fire managers the option of employing Minimum Impact Suppression Tactics (MIST) more frequently in the future. These tactics employ effective fire suppression with minimum damage or impact from suppression

tactics and include guidance for suppression and mop-up that is anticipated to further reduce impacts to salamander habitat and designated critical habitat PCEs.

The seasonality of prescribed burns and historical natural fires may be different, and may affect the salamander or components of its habitat differently. For example, Heinlein et al. (2005) assessed the seasonal distribution of historical, naturally occurring fires in ponderosa pine and mixed conifer forests in the southwest and reported that based on the relative position of each fire scar within the annual ring that the majority of fires occurred in the summer months (between late June and early September), but those sites with a south west aspect had a greater percentage of spring fires (between late April and early June). While the authors note that the results should be viewed with caution as they could not determine the season in the majority of fire scars, in an Ecological Restoration Institute Working Paper (No. 28) evaluating reference conditions to guide ecological restoration in southwestern forests, Margolis et al. (2013) specifically highlight that "tree-ring fire scars indicate that fires in warm/dry mixed-conifer historically occurred in the spring or summer, and were rare in the autumn (e.g., Heinlein et al. 2005, Margolis and Balmat 2009). This is important to consider when determining the timing of prescribed or managed fires." Moreover, data collected and reported in Margolis et al. 2013 was collected in part for a Collaborative Forest Landscape Restoration project specifically funded to guide forest restoration treatments in Jemez Mountains salamander habitat to better understand how to protect the salamander while conducting forest restoration treatments. Therefore, off-season burning may be an important consideration when returning fire back into salamander habitat, and should be more fully investigated, but we are not currently aware of any significant potential impacts. There may be some unknown adverse impacts to the salamander's microhabitat resulting from atypical seasonal burning; however, we do not anticipate any unknown potential impacts to be significant, as most salamanders will have returned to underground habitat, and the above ground habitat will have almost a full year to ameliorate any short-term changes prior to salamanders being surface active again. Finally, because salamanders evolved in a fire adapted ecosystem, and are likely adapted to any potential short-term changes in microhabitat from fire, it is anticipated that in most cases, the prescribed fires will not have any significant adverse effects to the salamander, its habitat, or designated critical habitat.

Landscapes treated by thinning and prescribed fire may reduce the management of wildfires (unplanned ignitions) even further to monitoring and minimal suppression activities. Prescribed fires are ignited under prescriptions and ignition patterns in tended to minimize fire intensity and severity. You report that low intensity fire is known to increase the availability of minerals and encourages the establishment of grasses and forbs. Within salamander habitat (primarily mesic mixed conifer stands) prescribed burning in combination with thinning would likely promote forbs like forest fleabane, woodland strawberry, and Canadian white violet. Grasses like Thurber fescue, Parry's oatgrass, Arizona fescue, and pine dropseed (near montane grasslands), and Rocky Mountain Trisetum, fringed brome, and Ross' sedge (on high exposed ridges) are likely to respond to treatments on the edges of mixed conifer stands and on grassland soils. Understory response would likely be greater in areas where thinning and prescribed burning is combined, especially amongst the grass species. Understory species in forest stands that are further from forest edges may benefit more from lighter thinning treatments which are

proposed on slopes. Within the treatment areas, for those areas that burn with moderate intensity, we anticipate canopy closure will be modified and the amount of large woody debris (decomposing logs) may also be reduced. It is anticipated that the scattered openings will quickly fill in with herbaceous plant cover that will help retain soil moisture. Additionally, it is likely that most of the large logs on the north-facing slopes will remain following the prescribed fire due to the higher moisture content. Alternatively, conducting prescribed fires may also consume ground litter that helps to create moist conditions and stabilize soil and rocky slopes. Based on information provided by the Trust, you anticipate that the use of wildland fire in and out of salamander habitat will benefit through maximizing precipitation infiltration and soil moisture retention, while retaining important habitat features.

Unplanned ignitions can negatively impact salamanders, salamander habitat, and designated critical habitat because these fires most often occur during the hottest, driest times of the year and can burn with the greatest severity. Although managed fires will still be managed within a set of parameters to meet resource objectives, some factors will not be in control of the Trust. How managed, unplanned ignitions may affect salamanders underground is not known. However, in other areas that have burned in recent large-scale, high-severity wildfires, that received intense heat and downward flux, and were not characteristic of the historical fire regime, nor patterns, some individual salamanders still persist. Both short- and long-term effects of these types of fires still remains unknown, but suggest that salamanders can likely tolerate unplanned managed fires, even though they may burn with greater severity than planned, prescribed burns.

To reduce effects to the salamander, its habitat, designated critical habitat PCEs in all wildfires the following performance requirements will be put in place:

- Within the Wildland Fire Decision Support System (WFDSS), for each incident with the potential to affect salamanders, salamander habitat or designated critical habitat, protection of the salamander, important habitat features, and designated critical habitat should be among the primary objectives.
- For each such incident, weigh the potential effects of fire versus suppression and select alternatives that are likely to result in the least degree of adverse effect to the salamander and its habitat where consistent with public and fire fighter safety and protection of homes, and critical infrastructure.
- Management of aircraft (helicopters) including staging and refueling away from salamander habitat.
- Use of approved foaming agents or water to retard the spread of fire or to protect sensitive features.
- Use of approved foaming agents or water in combination with minimal digging and scraping to extinguish fire in lieu of heavy equipment and dry mopping within salamander and habitat.
- Locating areas to store or stage water tanks and vehicles away from salamander habitat.

- Staging, parking, and turning vehicles and equipment from away salamander habitat.
- Establishing camps for short term staging of vehicles and personnel and project management away from salamander habitat

It is anticipated that the use of wildland fire will serve to protect and preserve salamander habitat by reducing the fuel loadings and continuity across the landscape. Reduced fuel loads would in turn reduce the severity of any future fires, even fires burning under very hot and dry conditions.

Other Activities Associated with Wildland Fire - Planned Ignitions

Wildland fire management activities include actions to prepare, ignite, control, or otherwise manage wildland fire. All existing best management practices, conservation measures, and performance requirements for working in salamander habitat apply; however, some exceptions may be required to carry out a planned ignition wildland fire. The following activities associated with carrying out a planned ignition fire are anticipated to have the following direct and indirect effects to salamanders, their habitat, and designated critical habitat:

- Construction of control lines (clearing all vegetation and debris to expose only bare dirt or rock) using hand tools or mechanized equipment. You will primarily use existing roads and control features with some hand line or plow line as needed. These lines are planned and constructed in advance, used minimally and not implemented through archaeological sites or salamander habitat. We do not anticipate any effects to salamanders, their habitat, or designated critical habitat because you will utilize existing features and avoid this action in salamander habitat.
- Igniting fire by hand using a gasoline-diesel fuel mix, mixing and dispensing of the fuel mixture, and use of aerial ignition devices. We anticipate that fuels will primarily be consumed with fire. Seasonal restrictions will limit the potential direct exposure of salamanders to petroleum fuels. Any unignited fuel may contaminate soil with chemicals harmful to amphibians. While impacts from the use of petroleum fuels to ignite fire may occur from unignited fuels remaining in the habitat, we anticipate that impacts would be on a very small scale. Because most fuel will be consumed by fire, and any unconsumed fuel would remain on a very small scale, salamanders are generally rare across the landscape, the likelihood of an individual salamander encountering the spots with unconsumed fuel is very small, and considered insignificant and discountable.
- Management of aircraft (helicopters) including staging and refueling will occur outside of salamander habitat and primarily occur in areas of previous disturbance. We do not anticipate any significant adverse effects to the salamander, its habitat, or designated critical habitat.
- Use of approved foaming agents or water to retard the spread of fire or to protect sensitive features or use of approved foaming agents or water in combination with digging and scraping to extinguish fire. It is anticipated that foaming agents will only be used on small scales to protect existing structures and is very unlikely to be needed in salamander habitat. We do not anticipate any adverse effects to the salamander, its habitat, or designated critical habitat from foaming agents. Using surface water to manage wildfire has the potential to move amphibian disease and pathogens into other

aquatic ecosystems and into salamander habitat. Amphibian pathogens and the threat of introducing them into salamander habitat is described under ***Research, Inventory, Monitoring, and Evaluation*** below.

- Reducing concentrations of fuel adjacent to control lines or surrounding sensitive features by hand or using equipment. These specific actions will be coordinated annually, with important salamander areas possibly being one of the "sensitive features" being protected. Other features, such as archeology sites in salamander habitat that may need protection, will also be identified on an annual basis, and may include avoiding important salamander habitat or maintaining important features. We anticipate that effects to the salamander, its habitat, and designated critical habitat will most likely be small in scale, could protect some important salamander areas, and not have significant negative impacts to the salamander, its habitat, or designated critical habitat.
- Storage or staging of water tanks and vehicles; staging, parking, and turning vehicles and equipment; and establishing camps for short term staging of vehicles, personnel and project management will be done outside of salamander habitat, or on existing disturbed features such as a road bed or well pad, and should not affect the salamander, its habitat, or designated critical habitat.

Other Activities Associated with Wildland Fire - UnPlanned Ignitions

Any of the associated activities described for Planned Ignitions above could be needed for unplanned ignitions as well, only with less ability to plan or control the location of the actions. The Trust will to the greatest extent practical, use existing roads as fire breaks, avoid, or go around areas known to have high densities of salamanders, implement all other conservation measures, in addition to instructing fire-fighting crews to avoid old logs and stumps and rock-piles when laying out hand line. Equipment operators will be instructed similarly, although lines created by bulldozers are less flexible in certain locations. Localized thinning or fuel-break construction may be used in association with control lines or to protect cultural or natural features from fire. All best management practices, conservation measures, and performance requirements will be in place unless the specifics of managing an unplanned fire requires action outside of those requirements. Managing an unplanned fire can impose conditions that are not within the control of the Trust. In these cases, the net benefit of implementing actions, such as control lines, will outweigh the potential adverse effects to large areas of salamander habitat if uncontrolled wildfire were to burn through the habitat.

Wildland Fire and Mastication

As with potential effects from leaving masticated material in place, there is also uncertainty regarding fire behavior and fire effects of using fire in masticated forests. However, relevant to salamanders, some work has been done assessing soil heating and temperatures in areas that have received mastication treatments then burned with prescribed fire. In Fire Science Brief Issue 70 (2009), authors state that when masticated fuels are burned, soil temperatures can get extremely hot, and in some case, nearly twice as hot as natural fuels, but are related to fuel loads and soil moisture levels at the time of burning. They continue that these effects can be ameliorated by

using prescribed fire when soil moisture content is high but not if an unplanned ignition burned the materials when soil moisture is dry. However, the acceptable amelioration of effects includes limiting the lethal temperature for tree roots (greater than 140° F/60° C) to the top few inches of soil. The critical thermal maximum for the salamander is 33.5°C, that is, the temperature that is lethal to a salamander. Monitoring soil temperature and moisture in areas masticated and burned will help resolve some uncertainty regarding the potential effects to salamanders from burning masticated material.

Summary of Wildland Fire

It is anticipated that the use of wildland fire will serve to protect and preserve salamander habitat by reducing the fuel loadings and continuity across the landscape. Reduced fuel loads would in turn reduce the severity of any future fires, even fires burning under very hot and dry conditions. Reduced fuel loadings and reducing the fire behavior potential at the landscape scale can increase opportunities for fire managers to more frequently use unplanned fires to safely meet resource objectives, and for employing *MIST* in the future. Performance and conservation measures are proposed as part of the action and are designed to remove and minimize any potential direct and indirect effects to the salamander, its habitat, and its designated critical habitat and PCEs related to all actions associated with the use of wildland fire.

Within the treatment areas, for those areas that burn with low intensity, we anticipate a positive understory response that will improve soil moisture conditions, and thus benefit the salamander and its habitat. For those areas that burn with moderate intensity, we anticipate that canopy closure will be modified and the amount of large woody debris (decomposing logs) may also be reduced. It is anticipated that the scattered openings will quickly fill in with herbaceous plant cover that will help retain soil moisture. Additionally, it is likely that most of the large logs on the north-facing slopes will remain following the prescribed fire due to the higher moisture content. Alternatively, conducting prescribed fires may also consume ground litter that helps to create moist conditions and stabilize soil and rocky slopes. Based on information provided by the Trust, you anticipate that the use of wildland fire in and out of salamander habitat will benefit the salamander through maximizing precipitation infiltration and soil moisture retention, while retaining important habitat features. To verify achievement of your desired, predicted, and anticipated objectives, you have also included as part of your proposed action implementing soil monitoring and invertebrate pitfall trapping monitoring. These data will be used to adaptively manage treatments in or around salamander habitat.

For these reasons, we expect the low to moderate intensity prescribed burn will retain the majority of important habitat components such as the dominant and co-dominant (larger) trees and overstory canopy cover, while consuming primarily the smaller trees and fine surface fuels. By returning low and moderate severity fire into the ecosystem in which the salamander evolved, hazardous fuels will be reduced, while beginning to restore forest composition and structure to the area. Prescribed fire should benefit the salamander in the long-term by reducing the risk of severe wildland fires and by returning fire back to the ecosystem.

Depending on time of year, fire can also negatively impact the salamander when the species is active above ground (typically from July to September). However, prescribed fire in the Jemez Mountains is often planned to occur after mid-October (when the salamanders are not active above ground), because low wind and increased moisture during this time allow more control, lowering chances of the fire's escape. Burning in spring will likely occur in March through early May when soil temperatures begin to warm. Unplanned ignitions are typically the result of a lightning strike, and typically occur in spring or early summer, prior to, or at the initiation of the summer monsoons. Therefore, it is unlikely that the salamander would be on or near the surface during these periods. Burning in the late summer or fall would be conducted during warmer temperatures, but a burn plan would prescribe the range of moisture of ground fuels must be dry enough to carry a fire. Consequently, even though this may be within the general active season of the salamander, there is a very low potential of individuals being active on or near the surface because the low range of fuel moisture needed to carry a fire would be an insufficient amount to trigger surface activity of salamanders. Therefore, we conclude there is a low potential for direct effects to salamander from planned ignition wildland fires.

Responding to Natural Events; Post-Fire/Insect Attack Restoration Actions

Rehabilitation in burned areas or areas affected by insects will be implemented as needed and may include any mechanical treatment, including felling trees, lop and scatter, or mastication to provide surface cover, or other activities aimed to stabilize soil, maintain soil moisture, or increase available surface cover. All performance requirements will apply, and additional measures, such as leaving five large (largest available) logs per acre to supplement or replace logs burned by wildfire, and provide cover objects for salamanders active above ground will be implemented. As with all other treatments, rehabilitation actions in salamander habitat will be coordinated annually, or as needed in the interim of annual meetings, between the Trust and the Service. It is anticipated that all rehabilitation actions considered will be of benefit to the salamander in both the short and long term.

Road Management

Overall, we anticipate that road management on the preserve will benefit the salamander, its habitat, and designated critical habitat, because you are proposing greatly reduce the existing roads on the preserve through closures and decommission and implement actions for the purpose of restoring hydrology and halt ongoing erosion. Approximately 52 miles of the 200 miles of roads to be maintained for ongoing use are in need of deferred maintenance to restore hydrology or halt ongoing erosion. Deferred maintenance activities include:

- Reshaping and resizing the existing road prism.
- Realignment to alter grades or reduce erosion.
- Constructing lead-outs, or installing or replacing culverts to improve drainage.
- Replacing fill
- Extracting and hauling aggregate material (gravel, rock, dirt, etc.).
- Staging equipment.

As part of the proposed action, conservation measures are included to minimize adverse effects to salamanders, their habitat, and designated critical habitat for actions related to road management and maintenance on the preserve. No new road construction is being proposed; however, there may be some circumstances where temporary roads construction may be warranted. In general temporary road construction will be avoided. Within salamander critical habitat, new temporary roads will not be established except as necessary to directly achieve the protection and improvement of salamander critical habitat or otherwise benefit the salamander. This action would be coordinated in advance through the annual consultation. Furthermore, the performance requirements in the BA, which constrain the use of heavy equipment in salamander habitat will also apply. Thus, reshaping and resizing the existing road prism and realignment to alter grades or reduce erosion will only occur in salamander habitat or designated critical habitat when the action is needed to further protect the salamander, its habitat, or other important resources and will be coordinated annually. Any exceptions to this that occur in salamander habitat are likely to be rare and small in scale.

Extraction of aggregate material (gravel, rock, dirt, etc.) will not occur in salamander habitat or designated critical habitat and will not affect the species or its habitat. Any actions that may continue on existing roadbeds, such as non-motorized use, placement of biomass or logs, staging of equipment, and grading are not expected to affect the salamander or its habitat because these areas are not considered to be occupied by the salamander or containing sufficient PCEs (existing roads are compacted and not usable to salamanders). However, salamanders are known to occur in road cuts and in the shoulders of some roads (when the road goes through salamander habitat). Maintenance or installation of culverts, or drainage features when conducted in salamander habitat may have some small-scale direct and indirect impacts. Direct effects to the species, including injury or death from crushing could be expected if machinery is used to dig or install culverts or drainage features if salamanders occur in the footprint of the specific work. The best time of year to conduct specific actions that require digging in occupied salamander habitat would be outside of the normal time restrictions, and should be conducted when conditions are wet, so that there is at least an opportunity to find salamanders and temporarily move any present out of harm's way from the footprint. Because this work will be planned and coordinated in advance, these preconstruction measures can be taken to reduce the potential for salamanders to be present in the footprint. Indirect effects could include making very small-scale areas of salamander habitat unusable if a culvert of other drainage feature is installed in salamander habitat. However, installation of drainage features will have an overarching benefit of restoring hydrology, stabilizing the hillside and reducing erosion; which will benefit salamander habitat on that slope.

Watershed Restoration

Activities such as planting, placing sod, erecting fences or barriers, placing structures to reduce the energy flow, removal of manmade impoundments with heavy equipment will be used to restore previously diverted stream courses, to address localized erosion in riparian or upland environments. These activities will follow all other performance requirements and conservation measures for the salamander, and we anticipate that actions implemented for watershed restoration will be to the benefit of salamanders and their habitat.

Erosion Control

Activities other than road maintenance to prevent, control, or halt erosion may include the rehabilitation of other existing infrastructure features such as well pads, log landing or livestock gathering areas. Rehabilitation of these localized features will generally include erosion control (placement of logs, rocks, or man-made features to halt erosion), construction of contours or placement of culverts to provide drainage, or soil scarification to promote the establishment of native grasses. These activities will follow all other performance requirements and conservation measures and either promote the restoration of salamander habitat for areas that are currently not usable by salamanders (e.g. rehabilitation of well pads), will not be conducted in salamander habitat (e.g. construction of contours), or will be very small in scale, and have similar effects as actions related to road maintenance (e.g. placement of culverts). We anticipate that effects from erosion control activities will either benefit the species or have similar effects to those resulting from actions conducted for road maintenance.

Noxious Weed Control

On the VCNP, there are no known areas with noxious weeds in salamander habitat or critical habitat. Therefore, the likelihood of needing to implement noxious weed control in salamander habitat or designated critical habitat is small, but remotely possible. If noxious weed control is needed in salamander habitat or designated critical habitat, techniques to minimize any potential effects to the species or its habitat will be used, including hand-pulling and single-plant herbicide applications. Because the need for this action is very low, and effects from the action would be very small in scale (single-plant), we anticipate that any potential effects would be insignificant and discountable.

Research, Inventory, Monitoring, and Evaluation

We anticipate that some of the scientific research, inventory and monitoring programs will compliment and provide information to assist in understanding the ecology of salamander and its habitat. Habitat characterizations, inventories and monitoring of food prey species, climate measures, etc., can be used to identify the status and trends of environmental variables influencing salamander populations and distributions. Once a protocol for monitoring salamander populations directly is developed and approved, the Trust will employ this protocol to actively monitor salamanders on the preserve. Any deployment of instruments or sampling sites in salamander habitat has the potential to disturb microhabitat and/or individual salamanders. During the Trust's Scientific Research Permit application process, researchers must clearly describe their intended actions to ensure that no ground-disturbing activity will take place without site review and supervision (this also applies for Cultural Resources clearances as well). We anticipate these types of disturbances to be infrequent and small in scale. Other ongoing research throughout the preserve has the potential to move amphibian pathogens around the preserve, within aquatic sites, within terrestrial sites, and between aquatic and terrestrial sites. Movement of pathogens or diseases can consist of pathogens or disease already existing on the

preserve, or newly introduced pathogens or diseases. Because the amphibian pathogen, *Batrachochytrium dendrobatidis* (Bd) has been detected in a Jemez Mountains salamander on the preserve, and there is a high probability that this disease organism eliminated native Northern leopard frogs from the preserve in the late 1980s to early 1990s, the potential of inadvertently moving pathogens around the preserve is of high concern. Furthermore, other pathogens, such as ranaviruses, may also be present on the preserve, for which the introduction of these viruses into Jemez Mountains salamander habitat is also of great concern. The susceptibility of Jemez Mountains salamanders to Bd, ranavirus, or other pathogens is unknown, as it has not been specifically studied and many factors influence susceptibility that include species specific and population specific factors (possibly genetic, epigenetic (non-genetic influences on gene expression), microbial, and other environmental factors), as well as the pathogenicity of the strains of the pathogen, and other stressors affecting individuals, such as warming and drying of habitat (from drought, climate change, or other factors).

To conduct surveys for salamanders, individuals are required to obtain and possess a permit pursuant to section 10(a)1(A) of the Act that requires attending a training seminar for Jemez Mountains salamanders to includes biosecurity protocols (methods to reduce the risk of spreading pathogens). These protocols are required and if followed, should reduce the risk of transferring pathogens among salamander sites. However, there are many other researchers and technicians moving within and among aquatic and terrestrial sites and have the high potential of moving pathogens into Jemez Mountains salamander habitat. As is the case with noxious weeds, the best strategy for minimizing harm as a result of the introduction of a noxious weed, is to prevent its introduction in the first place, but then also to contain or eliminate existing sources. With amphibian pathogens, there is no mechanism to eliminate either Bd or ranavirus once it is in a habitat; so the best strategy is to reduce the risk of transferring pathogens through strict biosecurity protocols. While we do not know the specific susceptibility of Jemez Mountains salamanders to pathogens, such as Bd or ranavirus, these diseases have resulted in declines, extirpations, and extinctions of amphibians around the world and believe they have the potential to be a significant threat to the Jemez Mountains salamander. Biosecurity protocols for research and other human activities are needed to reduce the risk of spreading existing and newly introduced amphibian pathogens around the preserve, and into Jemez Mountains salamander habitat.

Overall Summary

A landscape approach is being taken to break up the continuity of fuels over the landscape, and within that framework there are opportunities to be flexible with where, when, and how treatment are applied while retaining important salamander components.

The Trust is proposing to remove a greater amount of fuel from areas that are less likely to be occupied by salamanders (but some of which are still likely occupied) and remove a lesser amount of fuels in areas that are more likely to be occupied by salamanders. There is a great deal of uncertainty regarding the potential effects to the salamander and its habitat resulting from mastication and burning masticated material. The proposed action will be flexible on how and

when treatments are conducted across the landscape to provide to most protection and least impacts to the salamander, its habitat, and designated critical habitat PCEs.

Performance requirements and conservation measures are also included to minimize direct and indirect effects to the salamander, its habitat, and designated critical habitat PCEs. Monitoring important habitat features (e.g. soil moisture and invertebrate prey) will follow treatments to provide data where greater uncertainty exists. Any new information will be incorporated into subsequent actions on an annual basis to further minimize any potential adverse impacts to the salamander, its habitat, or designated critical habitat PCEs.

There are no existing biosecurity policies or procedures for activities on the preserve to reduce the risk of spreading Bd, ranavirus, and other pathogens around the preserve and into Jemez Mountains salamander habitat incidental to human activities, including research, inventory, and monitoring activities throughout the preserve.

We anticipate that there may be some short-term adverse effects, but long-term benefits from the implementation of the Valles Caldera National Preserve Landscape Restoration and Stewardship Plan. We believe the treatments and other actions will benefit the salamander by restoring ecological processes and reducing the probability of a large crown fire that may otherwise severely impact salamander habitat. Reducing the risk of crown fires throughout the preserve will also reduce chances for spread of fire to surrounding areas of salamander habitat off the preserve.

CUMULATIVE EFFECTS

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation." Other activities may have the potential to affect the salamanders and its proposed critical habitats on the Valles Caldera National Preserve. We are not aware of any cumulative effects that will affect this species.

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).

After reviewing the current status of the salamander, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the Valles Caldera National Preserve Landscape Restoration and Stewardship Plan

is not likely to jeopardize the continued existence of the Jemez Mountains salamander. We also find that the effects are not likely to destroy or adversely modify critical habitat. Consequently, we do not expect the effects of the proposed action to impede the survival or recovery of Jemez Mountains salamander. Our conclusion is based on the following:

1. The best available information suggests that high intensity, uncontrolled wildfire is the primary threat to the salamander and its habitat. Mechanical treatments and wildland fire are essential management tools to help prevent or reduce the probability for landscape-wide, stand-replacing wildfires and is thought to be necessary for the long-term sustainability of salamander habitat. There is a much higher risk to loss of individuals and habitat from severe wildfire than from mechanical treatments and wildland fire use and associated actions.

2. All treatments in salamander habitat and around salamander habitat will be coordinated among the Trust and the Service annually. Because treatments and actions are being conducted on a landscape scale, there is a high degree of flexibility to conduct actions to minimize adverse effects to the salamander and its habitat while maximizing restoration and meeting objectives.

3. All actions are to meet the objectives of restoring and improving the quality of wildlife habitat and ecosystem functions. The Trust will work with the Service annually to adaptively manage proposed actions to minimize adverse effects to the salamander, its habitat, and designated critical habitat PCEs and to implement actions that contribute to the conservation and recovery of the species.

4. Performance requirements and conservation measures that are part of the proposed action have greatly reduced any potential direct and indirect effects to the species, its habitat, and designated critical habitat.

5. Most adverse impacts to the species and critical habitat from the proposed action will be short-term, or small in scale. Overall, the proposed action will have long-term benefits.

6. The proposed action, including performance requirements and conservation measures are designed to promote the conservation and recovery of the salamander, including the monitoring of the project area before, during, and after implementation of the proposed action.

7. Although some uncertainty exists in regard to the effects of the action, monitoring and adaptive management are built into the proposed action, so if the effects to salamander, its habitat, or designated critical habitat PCEs are greater than anticipated, treatments will be halted or modified as needed.

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 Performance Requirements and Conservation Measures that are 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 Trust so that they become binding conditions of any grant or permit issued to the applicants, as appropriate, for the exemption in section 7(o)(2) to apply. The Trust has a continuing duty to regulate the activity covered by this incidental take statement. If the Trust 1) fails to assume and implement the terms and conditions or 2) fails to require the applicants 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 Trust must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

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 indirect effects resulting from the implementation of the proposed action. We anticipate that most forms of harm and 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, changes resulting from mastication material, limited areas of soil compaction). There may be occasional injury or death resulting from crushing in rare cases when an excavation is required to contribute to greater restoration action (e.g. installation of a culvert to reduce/prevent greater hillslope erosion), or rarely if any salamanders remain surface active outside of the seasonal timing restrictions for working in salamander habitat. It is not anticipated that the proposed action will significantly disrupt normal behavior patterns including, but not limited to, breeding, feeding, or sheltering.

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 and wildland fire) 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 and harassment resulting from indirect effects related to short-term alterations in habitat. Therefore, it is difficult to estimate the number of individuals that will be taken as a result of the proposed action. 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 21,500 acres throughout 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 10,750 acres). 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 21,500 acres of habitat disturbance over the life of this consultation with no more than 10,750 of 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 there 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.

EFFECT OF THE TAKE

We have determined that the level of take described above is not likely to result in jeopardy to the salamander.

REASONABLE AND PRUDENT MEASURES

The reasonable and prudent measures, and implementing terms and conditions are designed to minimize the effects of incidental take that might otherwise result from the action. In addition to the Performance Requirements and Conservation Measures already proposed as part of the project description, the Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the salamander:

1. Identify areas on the Preserve with higher quality salamander habitat and/or areas of higher densities of salamanders and protect those areas from large and small scale impacts.
2. Protect the species from inadvertent introduction of disease or pathogens.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Trust and their employees, contractors, or subcontractors must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring. These terms and conditions are nondiscretionary.

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 Trust must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

The following Terms and Conditions are established to implement the Reasonable and Prudent Measures:

1. The Trust will meet annually with the Service to:

    1.1. Identify areas of higher quality habitat or that have higher densities of salamanders that will be the focus of protection from small scale and large scale impacts.

    1.2 Identify new strategies to minimize impacts to the salamander or maximize conservation for the salamander.

2. The Trust will work with the Service to:

    2.1 Develop a water testing and monitoring strategy, and an action plan for surface water use in wildland fire prior to using surface water for wildland fire use for the purpose of minimizing the spread of amphibian pathogens from aquatic ecosystems to terrestrial ecosystems.

    2.2 Within one year of the issuance of this biological opinion, develop and implement a biosecurity strategy to minimize the introduction of amphibian pathogens and disease into Jemez Mountains salamander populations and habitat within the preserve.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to

develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the salamander. In furtherance of the purposes of the Act, we recommend implementing the following action:

1. The Trust is encouraged to closely coordinate with the Service during wildland fire management with unplanned ignitions to identify any additional measures to minimize take to salamanders, its habitat, and designated critical habitat.
2. The Trust is encouraged to send all field personnel to Jemez Mountains salamander training seminar to train field personnel on salamander biology and habitat requirements and importance of following strict biosecurity protocols.

Disposition of dead or injured listed animals

Upon finding dead, injured, or sick individual endangered or threatened species, initial notification must be made to the nearest Service Law Enforcement Office. In New Mexico, contact the Law Enforcement Office (505-346-7828) or the New Mexico Ecological Services Field Office (505-346-2525). Written notification must be made within 5 calendar days and include date, time, and location, photograph, and any other pertinent information. Care must be taken in handling sick or injured animals to ensure effective treatment and care and in handling dead specimens to preserve biological material in the best possible condition. If feasible, remains of intact specimens of listed species will be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, information noted above will be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens will be made with the institution before carrying out of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any listed species survive treatment, we should be contacted regarding final disposition of the animal.

REINITIATION NOTICE

This concludes formal consultation on the Landscape Restoration and Stewardship Project, on the Valles Caldera National Preserve.

As provided in 50 CFR §402.16, reinitation 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 reinitation.

In future communications regarding this project, please refer to consultation #02ENNM00-2013-FC-0041. If you have any questions or would like to discuss any part of this conference opinion, please contact Michelle Christman or Eric Hein of my staff at 505-761-4715 or 505-761-4735, respectively.

Sincerely,

Wally Murphy
Field Supervisor

cc:
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico