Salt Timber Harvest and Fuel Hazard Reduction Project

Biological Evaluation for Sensitive Plants and Supplementary Botany Report for Forest Endemic Plants, Survey and Manage Species, and Noxious Weeds

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March 30, 2009

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Introduction

The purpose of the Biological Evaluation/Assessment (BE/BA) is to review the proposed Salt Timber and Fuels Reduction Project in sufficient detail to determine whether the proposed action will result in a trend toward federal listing of any Sensitive vascular plant, bryophyte or fungi species, as designated by the Region 5 Sensitive Plant List. The purpose of the botany supplemental report (Appendix B) is to address other species of concern such as Forest Plan endemic species and Survey and Manage Species as described in the Northwest Forest Plan Amendment.

In addition Forest Service policies emphasize the prevention of weed establishment and have developed prevention practices such as including equipment cleaning provisions in timber sale contracts, avoiding travel through known weed patches where possible, minimizing soil disturbance, and using weed-free gravel, seed and mulch. These measures reduce the probability of spreading weed seeds and plant parts. Actual weed establishment is associated with the proximity of a weed seed source, soil disturbance, as well as movement of animals (birds, deer) and mechanical equipment. Weed issues are detailed in the Noxious Weed Risk Assessment for this project (Appendix C).

Regulatory Framework

Categories of Plant Species of Concern

Current management direction mandates conservation of several categories of rare plants on the Shasta-Trinity National Forest.

Federally Endangered and Threatened species are those listed under the Endangered Species Act of 1973. There are no federally listed Endangered or Threatened plants known to occur on the Shasta-Trinity National Forests: neither are any plant species proposed for listing.

Sensitive species are those vascular plant, bryophyte, lichen, and fungi species eligible for listing under the Endangered Species Act, or whose viability is of concern. These are protected by USDA Forest Service regulations and manual direction. The Region 5 Sensitive Plant List was updated and signed October 1, 2006 by the Regional Forester and was amended in 2004 to include 13 additional species from the Survey and Manage list.

Forest Plan Endemic species are rare species confined wholly or mostly to the Shasta-Trinity National Forests. These are afforded the same protection as sensitive species by mandate of the Shasta-Trinity Land and Resource Management Plan (LRMP) (USDA, 1995). If present, these species are addressed in the Supplemental Botanical Report (Appendix B).

Watch List species are those that do not meet the criteria to be included on the Regional Forester's Sensitive Plant List or the LRMP, but are of sufficient local viability concern to be considered in the planning process. If present, these species are addressed in the Supplemental Botany Report (Appendix B).

TES Plants

This evaluation was prepared in accordance with USDA Forest Service policy (FSM 26.70.32 & 2672.4). The National Forest Management Act directs the Forest Service to review programs and activities to ensure that species do not become threatened or endangered as a result of Forest Service actions. Forest Service direction (FSM 2672.1-2672.43) requires that programs or

activities be reviewed for potential effects on rare species and outlines policy, objectives and procedures. The Shasta-Trinity National Forest is directed by the forest plan to manage populations so as not to contribute to the need for listing under the Endangered Species Act (USDA Forest Service 1994).

At present, no plants on the Shasta-Trinity National Forest are listed federally as Threatened or Endangered, therefore there will be no effects to those species and this document will not address them further. One California state-listed Endangered plant species, *Eriogonum alpinum*, occurs on the forest west of Interstate 5 but is only found on the east side of the Forest and is not expected in this project area. The design criteria for the Salt Timber Harvest and Fuel Reduction Project were developed to reduce the risk of impacting any rare plant species.

Proposed Action

For a full description of the alternative refer to the Environmental Impact Statement for the Salt Timber Harvest and Fuels Reduction Project.

Design Criteria, Mitigation and Monitoring

Design criteria are common to both action alternatives. The design criteria do not apply to the no-action alternative beyond ongoing management.

- Contract Provision C/Ct6.25#, or equivalent would be included in all contracts for this proposed project. This provision extends protection to any sensitive plants listed on the Regional Forester's Sensitive Species List and provides for halting operations in the vicinity of newly discovered populations after completion of the Biological Evaluation or NEPA document.

- Exclude proposed treatments within the buffered populations of brownie and mountain lady's-slipper orchids in Unit 11, to avoid any impacts to these species.

- Apply soil productivity standards for conservation of surface organic matter and large woody material (FSH 2509.18) to maintain Sensitive fungi habitat components

- Apply Shasta-Trinity LRMP standards and guides for woody material retention (Appendix G) to maintain Sensitive fungi habitat components

- To meet Aquatic Conservation Strategy Objectives #8 and #9 for maintenance of riparian species diversity to maintain Sensitive fungi habitat components; apply silvicultural practices for riparian reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics including species diversity needed to attain Aquatic Conservation Objectives.

- Exclude treatments within population areas in Units 5, 14, 43, and 45 to protect populations of serpentine goldenbush and Dubakella Mountain buckwheat

- Contract Provision C6.36 (5/01) [equipment cleaning], or equivalent, will be included in all contracts to reduce introduction of noxious weeds

- Avoid disturbance to Canada thistle populations in Units 2 and 22 to prevent spread of the weed.

- Seed all decommissioned roads, landings, and heavily used skid trails with native grass seed and/or non-persistent/sterile cereal grains as needed.

- Mulch all seeded areas with certified weed-free straw

Alternative 1 – No Action

The No Action alternative provides a point of reference from which to evaluate the action alternatives. This alternative would implement no activity at this time, allowing the existing conditions, which are inconsistent with the desired conditions for this area, to remain unchanged.

The no action alternative would result in no direct or indirect resource impacts, because no action is taken; however, the result of no action will move this area further away from desired conditions as defined in the overarching land management plan for this Forest. Much of the area would remain in single storied dense overstocked and stressed conditions continuing their susceptibility to drought, insect and disease and stand replacing crown fires. Understocked or over-mature mixed conifer stands will continue to experience mortality. Insect and disease impacts will continue including dwarf mistletoe in the ponderosa pine, Jeffery pine, incense cedar, white fire and Black oak. Mountain pine beetle will continue to kill individuals and groups of Jeffery pine, ponderosa pine and sugar pine. The fir engraver beetle will remain active in the white fir stands and white pine blister rust will continue to affect the younger age class sugar pine throughout the area.

Without action fuels would remain susceptible to carrying a crown fire through the area that could cause losses to natural resources, investments and the dispersed residential communities of Post Mountain, Peanut, Wildwood, and Hayfork and Platina. The fuel break on Blue Point Ridge would remain ineffective as a point of control in the event of a wildfire, or as a safety area or anchor for prescribed underburning.

No timber products would be provided from this matrix land which is allocated as suitable for timber production. The publics' demand for wood products and the need to support the local wood processing industry, which is necessary for future vegetation and fuel management on the Shasta Trinity National Forest, will not be addressed. The commercial value of timber in overmature and understocked areas will continue to decrease and the growth of trees within plantations and within young overstocked stands will continue to be suppressed.

Roads no longer needed for management would remain as potential sediment sources.

Habitat would continue to improve for species dependent on late-seral forest conditions (more shade, organic matter, duff). Conditions would continue to improve or at least remain static for serpentine-dependent spp. with no threat of degradation because of high intensity wildfire.

Alternative 2 – Proposed Action

This alternative was designed specifically to meet the purpose and need for this project, which is to: improve forest health and resiliency; reduce hazardous fuels conditions to reduce the potential for adverse impacts from wildfire to the National Forest and neighboring land; provide timber products; and, retain roads needed and decommission those not needed for future management.

Table 1 summarizes the actions to be taken with Alternative 2.

Table 1. Summary of vegetation treatments, logging systems, and connected road activity for each Alternative

Timber Stand Activity	Alt. 2
Proposed Vegetation Treatments (acres)	
Intermediate Thinning	963
Shelterwood Harvest – Green Tree Retention	31
Shaded Fuel Break Thin	103
Regeneration Harvest - Green Tree Retention	27
Hand Fuel Treatment	14
Precommercial Thin	481
Total Proposed Treatments (acres)	**1,619**
Yarding Systems (acres)	
Tractor Yarding	986
Helicopter Yarding	138
Sub-merchantable Fuel Treatment	
Treat on Site	1,306
Tractor Site Prep and Burn Piles	58
Handpile, Burn Piles	152
Tractor Jackpot Pile and Burn Piles	103
Tree Planting	27
Landings constructed (and existing)	39 (19)
Temporary Road Constructed (miles)	0.3
Estimated Biomass (dry tons)	15,073
Estimated Timber Harvest Volume (thousands of board feet, MBF)	9,365
Road Activities	
Roads constructed (miles)	0
Roads maintained (miles)	5.0
Roads reconstructed (miles)	17.1
Temporary roads constructed (miles)	0.3
Miles of road closed	0.4
Miles of roads decommissioned	
Unclassified roads decommissioned	9.5
Classified roads decommissioned	4.3
Total Miles of Roads Decommissioned	**13.8**
Borrow pit expanded for road surfacing	1

Alternative 3

This alternative was designed specifically to address and consider key issues raised during scoping. A key issue is a perceived or actual undesirable effect that would be caused by implementing the proposed action. We state that these issues are perceived because further analysis may determine the anticipated effect would not occur. The differences between Alternative 3 and the proposed action and the reason for the differences follow.

No Regeneration Harvest - Green Tree Retention Treatments

Scoping identified three potential concerns with regeneration harvest – green tree retention treatments.

- they could create new plantations that could not be managed by the Forest
- they could increase the risk from fire
- they might not contribute to resiliency or stand health

To address these concerns Alternative 3 will not include regeneration harvest - green tree retention harvest Units 37 and 40 - and the effects of not treating these units will be analyzed.

Retain Sixty Percent Canopy Cover Rather Than Fifty Percent

The intermediate thinning in Alternative 2 would thin from below and retain approximately 50% canopy cover. The shaded fuel break would retain approximately 40% canopy cover. The concern was raised in scoping that retaining less than 60% canopy cover could affect wildlife habitat.

To analyze these concerns Alternative 3 will retain 60% canopy closure in all intermediate thinning, hand thinning, and shaded fuel break thinning.

No Thinning in Ephemeral or Intermittent Riparian Reserves

Neither Alternative 2 nor Alternative 3 would thin within perennial stream riparian buffers. Alternative 2 would thin dense stands within ephemeral and intermittent stream riparian reserves following strict resource protection measures (See Section 2.4). A concern was raised in scoping that thinning within riparian reserves may have unintended effects on the watershed, fisheries and wildlife.

To analyze these concerns Alternative 3 will not thin 41 acres of intermittent or ephemeral streams that are within 16 different intermediate thin units and will not thin 60 aces within 22 of the pre-commercial thin units.

No Removal or Downgrading of Northern Spotted Owl Habitat

Treatments in Alternative 2 would remove approximately 11 acres of foraging habitat and downgrade 28 acres of moderate quality nesting and roosting habitat for the northern spotted owl (Wildlife Biological Assessment, p. 12 of 17 and 13 of 17). The concern was raised that when considered cumulatively with past projects the removal or downgrading of habitat could negatively affect spotted owls.

To address this concern the 11 acres of foraging habitat will not be treated (a portion of Unit 37. Unit 37 is excluded from Alternative 3 in its entirety because it is a regeneration harvest – green tree retention treatment). Additionally, the 28 acres of moderate quality nesting and roosting habitat will not be downgraded because 60% canopy cover will be retained, which will continue to provide moderate quality nesting and roosting habitat (Units 33c and 32).

No Construction of New Temporary Roads

Alternative 2 would construct 0.3 miles of temporary road to reduce skidding distances. The concern was raised that the construction of this 0.3 miles of new temporary roads may negatively impact hydrology and soil health and could impact wildlife.

To analyze this concern no temporary roads will be constructed Alternative 3.

Soils and Visual Concerns

During the scoping process the risk of soil erosion in Unit 6 was identified as a potential concern. This 3 acre unit was dropped in Alternative 3 to address that concern. Also during scoping the

visual effects of thinning the shaded fuel break (Unit 45) immediately adjacent to Highway 36 was considered. Since the vegetation between Highway 36 and road 30N46 is already fairly open the decision to drop this portion of the shaded fuel break in Alternative was made (3 acres).

All other actions are the same between Alternative 2 and 3. Table 2 displays Alternative 3 activities.

Table 2. Summary of vegetation treatments, logging systems, and connected road activity for Alternative 3

Timber Stand Activity	Alt. 3
Proposed Vegetation Treatments (acres)	
Intermediate Thinning	850
Shelterwood Harvest – Green Tree Retention	30
Shaded Fuel Break Thin	100
Regeneration Harvest - Green Tree Retention	0
Hand Fuel Treatment	14
Precommercial Thin	421
Total Proposed Treatments (acres)	**1,415**
Yarding Systems (acres)	
Tractor Yarding	867
Helicopter Yarding	113
Sub-merchantable Fuel Treatment	
Treat on Site	1,158
Tractor Site Prep and Burn Piles	30
Handpile, Burn Piles	127
Tractor Jackpot Pile and Burn Piles	100
Tree Planting	27
Landings constructed (and existing)	9 (11)
Temporary Road Constructed (miles)	0
Estimated Biomass (dry tons)	4,680
Estimated Timber Harvest Volume (thousands of board feet, MBF)	3,305
Road Activities	
Roads constructed (miles)	0
Roads maintained (miles)	5.0
Roads reconstructed (miles)	17.1
Temporary roads constructed (miles)	0.3
Miles of road closed	0.4
Miles of roads decommissioned	
Unclassified roads decommissioned	9.5
Classified roads decommissioned	4.3
Total Miles of Roads Decommissioned	**13.8**
Borrow pit expanded for road surfacing	1

Table 3. Resource Protection Measures for Sensitive Plants and Fungi, Forest Plan Endemics, and Preventing the Spread of Noxious Weeds by Unit and Alternative

Resource Protection Measures for Sensitive Plants and Fungi, Forest Plan Endemics, and Preventing the Spread of Noxious Weeds	Units	Alternative
Contract Provision C/Ct6.25# or equivalent would be included in all contracts. This provision extends protection to any Sensitive plants or fungi listed on the Regional Forester's Sensitive Species List and provides for halting operations in the vicinity of newly discovered populations after completion of the Biological Evaluation NEPA document.	All units	2 & 3
Exclude proposed treatments within buffered populations of Brownie and mountain lady's-slipper orchids in Unit 11, to avoid any impacts to these species.	11 11r	2 & 3
Exclude proposed treatments within buffered populations of Peanut sandwort in Units, to avoid any impacts to this species.	32, 33A 32r, 33Ar	2 & 3
Apply Aquatic Conservation Strategy Objectives #8 and #9 for maintenance of riparian species diversity to maintain Sensitive fungi habitat components.	1, 2A, 2B, 2C, 3, 4, 5, 7, 9B, 10, 11, 12, 13, 21, 25A, 26, 32, 33A, 36, 45 1r, 2Ar, 2Br, 2Cr, 3, 4, 5r, 7r, 9Br, 10r, 11r, 12r, 13r, 21r, 25A, 26, 32r, 33Ar, 36r, 45r	2 3
Exclude treatments within population areas in Units to protect populations of serpentine goldenbush and Dubakella Mountain buckwheat.	5, 14, 17, 18, , 21, 22, 30A, 32, and 45 5r, 14, 17, 18r, 21r, 22r, 30A, 32r, and 45r.	2 3
Contract Provision C6.36/ (5/01) [equipment cleaning] or equivalent would be included in the contract to reduce introduction of noxious weeds.	All units.	2 & 3
Avoid disturbance to Canada thistle populations to prevent spread of the weed.	2C, 22r 2C, 22r	2 3
Surface organic matter and large woody material (retained as listed elsewhere in Chapter 2 of the EIS) will maintain Sensitive fungi habitat components.	All units.	2 & 3

Affected Environment

Existing Condition

The project area is located at: Township 29 North, Range 11 West, Sections 4-9; Township 29 North, Range 12 West, Sections 1, 2, 12; Township 30 North, Range 11 West, Section 31, Township 30 North, Range 12 West, Section 25, 26, 35, 36; Mount Diablo Meridian

Habitat within the planning area ranges from montane shrubland to mature mixed conifer/hardwood forest. Conifer types within the planning area ranges primarily from early seral conifer plantations to late seral Douglas fir or mixed conifer forest. Other habitats include large and small serpentine outcrops, Jeffrey pine/incense cedar woodlands (serpentine), riparian, isolated rock outcrops, conifer plantations, grassland, non-commercial open sites, and mid-mature to mature conifer forest. Little or no late-seral habitat is present in the project area although it is

present in the surrounding watersheds (Shasta-Trinity GIS database, LMPveg). Non-conifer habitat types, primarily montane shrubs, closed-cone forest, open grasslands, and oak woodlands occupy approximately 13% of the area. Elevations range from 3600 to 5900 feet.

Ecological Context: the project area is within the Rattlesnake Creek Terrane Subsection (M261Au) of the Klamath Mountain Ecological Section of California (USDA, 1997). The project area is also within the Klamath Ranges as described by the Jepson Manual of Higher Plants of California (Hickman, 1993). The project area falls almost entirely within the Salt Creek 5th field watersheds.

The majority of the proposed project area is within the Rattlesnake Creek Terrane (USDA, 1997), a geologic area with a heavy concentration of ultramafic (serpentine) soils. These serpentine soils are highly intermixed with other, primarily metamorphic, soils. Transition zones between serpentine and non-serpentine soils and habitats tend to be very abrupt with little mixing between adjacent soils or vegetation types. Serpentine soils are more sensitive to disturbance, recover more slowly after disturbance, and include a unique group of plant species that are often rare and very limited in distribution. They also include many plant species that are very common and found regularly on these and other soils. Serpentine soil types, especially those supporting widely spaced trees or have a high percentage on barren ground are generally regarded as unproductive timber production areas.

Desired Condition

The proposed project area is included in Management Area 19, Wildwood. This management area includes Peanut sandwort and the entire geographic range of Niles' madia. (LRMP 4-157). Supplemental Botany direction for this Management Area includes surveying suitable habitat for additional populations of Niles' madia, and protecting the type locality of Niles' madia for scientific value.

Forestwide Standards & Guidelines for Sensitive & Endemic Plants (LRMP 4-14)

Standards and Guidelines applicable at the project level are:

4a. Map, record, and protect essential habitat for known and newly discovered Sensitive and endemic plant species until conservation strategies are developed.

4b. Analyze the potential effects of all ground-disturbing projects on Sensitive and endemic plants and their habitats. Mitigate project effects to avoid a decline in species viability at the Forest level.

4c. Monitor the effects of management activities on Sensitive and endemic plants. If monitoring results show a decline in species viability, alter management strategy.

The proposed action complies with Shasta-Trinity LRMP direction for management of Sensitive and Endemic plants (addressed in the BE and Appendix B).

Sensitive Plants

Two populations of Sensitive plants and 11 populations of Forest Plan Endemic plants were found during field surveys, including one population each of mountain and brownie lady's-slipper orchids (*Cypripedium montanum, C. fasciculatum*), 8 populations of serpentine goldenbush (*Ericameria ophitidis*) (Forest Plan Endemic), and 3 populations of Dubakella Mountain

buckwheat (*Eriogonum libertini*) (Forest Plan Endemic). There are 2 historic documented populations of Sensitive plant species and 12 documented populations of Forest Plan Endemic plants within the proposed project area, including 1 population of Peanut sandwort (*Minuartia rosei*), 1 population of mountain lady's-slipper (*Cypripedium montanum*), 7 populations of Dubakella Mountain buckwheat, and 5 populations of serpentine goldenbush.

Environmental Consequences

Methodology for Analysis

Potential rare plant habitat was assessed using the Order 3 Soil Survey of the Shasta-Trinity Forest Area (USDA, 1983), GIS records, the Shasta-Trinity NF GIS database, population records, Nakamura and Nelson (2001), the California Natural Diversity Database (CNDDB), personal field visits, and past field visits in the project area. Based on presence of suitable habitat, Sensitive plant species of concern for this project are listed in Appendix A.

Table 4-Sensitive Species Potentially in the Project Area

Scientific Name	Common Name
Buxbaumia viridis	Bug-on-a-stick
Chaenactis suffrutescens	Shasta pincushion
Dendrocollybia racemosa	Branched collybia
Cypripedium fasciculatum	Brownie lady's-slipper orchid
Cypripedium montanum	Mountain lady's-slipper orchid
Eriastrum tracyi	Tracy's wooly-stars
Harmonia doris-nileseae	Niles' madia
Harmonia stebbinsii	Stebbins' madia
Minuartia rosei	Peanut sandwort
Phaeocollybia olivacea	Olive phaeocollybia
Ptilidium californicum	Pacific fuzzwort
Smilax jamesii	English Peak greenbriar
Sowerbyella rhenana	Orange-cup fungus

Field surveys to verify presence or absence of plant species of concern were conducted in the proposed project area in 2007. All field surveys were performed at a time appropriate to make positive identifications of Sensitive plant species. All planned treatment units were surveyed with intuitive-controlled surveys by skilled botany personnel. No field surveys for Sensitive fungi were performed because project design features are included in this project that would protect Sensitive fungi if they do occur within a treatment unit. Specifically, the Shasta-Trinity LRMP standards and guides for woody material retention will be implemented to maintain Sensitive fungi habitat components and implementation of the Aquatic Conservation Strategy Standards and Guidelines will maintain riparian species diversity and maintain Sensitive fungi habitat components.

Species Accounts

Bug-on-a-stick (*Buxbaumia viridis*) is a bryophyte that occurs throughout the world, and in 6 northern and western states. It is ranked G3G4 with no State rank assigned yet. This rank means

there are more than 21 known occurrences worldwide (300 are known) and it is considered secure worldwide, but very rare in California. There are only 5 known occurrences in California, with one known from the Shasta-Trinity National Forest, around Eagle Ranch near Big Bar. The other populations from California are known from the Siskiyou, Six Rivers, Modoc, and Plumas National Forests.

Shasta pincushion (*Chaenactis suffretescens*) is a perennial that favors sandy, stabilized stream courses, but can be found in open, rocky roadcuts as well. It has been found only in California and is ranked as G3 S3.2, meaning there are between 21 and 100 populations worldwide. These populations are distributed in California throughout Trinity and Siskiyou counties. There are 16 known populations on the Shasta-Trinity National Forest, with 2 of these populations found within 5 miles of the project area.

Branched collybia (*Collybia racemosa*) is a fungi species that is widespread in the northern hemisphere but always locally rare (Castellano et. al., 2003). As with most fungi species little is known about its true distribution and abundance. It is ranked G2G3 and is widespread in the northern hemisphere. This rank means there are between 6 and 100 populations worldwide. A state rank has not been assigned, but Survey and Manage records indicate there are 31 potential populations in California; not all verified. It is found in clumps on rotting or mummified remnants of gilled mushrooms or seldom in nutrient-rich leaf mulch in forests.

Two historical populations are known from the Shasta-Trinity National Forest within Trinity County. Both are documented from herbarium sheets and neither has been revisited to verify the sitings, but both populations were documented by persons trained in mycology and considered to be experts in the field. One is recorded approximately 20 miles north near Junction City; the other is recorded within the town of Weaverville. Conifer forest is present in both of these locations, similar to that found in the Salt Project area, so it is likely suitable habitat for the species can be found in the project area.

Brownie lady's-slipper (*Cypripedium fasciculatum*) is a wide ranging but rare western North American orchid. It is ranked G4/S3.2 and is found in 8 western states. This rank means there are 21 to 100 populations known from California, but it is considered apparently secure globally. In this drier part of California, populations tend to be small and are usually confined to relatively moist habitats, especially older forests along riparian corridors. There are 40 known populations on the Shasta-Trinity National Forest, with 30 of these found in Trinity County. One population of Brownie lady's-slipper is known from the project area in Unit 11.

Mountain lady's-slipper (*Cypripedium montanum*) is another wide ranging but rare western North American orchid. It is ranked G4/S4 and is found in 6 western states. This rank means there are greater than 100 known populations from California, but it is considered apparently secure globally and statewide. In this drier part of California populations are very small and usually confined to relatively moist, shady habitats, especially older forests along riparian corridors. Habitat can be drier and more open than that for *C. fasciculatum*, but most populations away from riparian areas are confined to north or northeast aspects with filtered sunlight. There are 46 known populations on the Shasta-Trinity National Forest, with 26 known from Trinity County. One population of mountain lady's-slipper is known from the project area in Unit 11.

Tracy's wooly-stars (*Eriastrum tracyi*) occurs on dry, gravelly soils on flats and benches in closed-cone pine forests or chaparral below 4400 feet. This species was recently separated from Eriastrum brandegeae as a separate species. It is ranked G3 (not ranked in California yet) and is known only from California. This rank means there are 21 to 100 populations globally and within

California, and is considered threatened statewide. There is one known population on the Shasta-Trinity National Forest, with 12 other known populations outside of National Forest lands but within 3 miles of the Shasta-Trinity National Forest. These are found primarily in closed-cone pine chaparral in Tehama County. The closest know population is approximately 10 miles east of the project area near Knob Peak.

Niles' madia (*Harmonia doris-nileseae*) is an annual that fluctuates widely in size depending on annual climate. It is found on open serpentine soils and is almost entirely restricted to the Rattlesnake Creek Terrane. It is ranked G2 S1.1 meaning there are 20 or fewer populations worldwide and less than 1000 individuals in the State of California. Almost all populations are geographically restricted to the Rattlesnake Creek Terrane. There are 27 known populations on the Shasta-Trinity National Forest, with the closest known population found within 1 mile of the project area.

Stebbins' madia (*Harmonia stebbinsii*) is an annual that is endemic and entirely restricted to the Rattlesnake Creek Terrane. It is found on shallow, rocky, ultramafic soils in sparsely vegetated chaparral-woodland with less than 5% shrub and tree cover. It is ranked G2 S1.1 meaning there are 20 or fewer populations worldwide and less than 1000 individuals in the State of California. There are 16 known populations on the Shasta-Trinity National Forest, with the closest known population within a mile of the project area.

Peanut sandwort (*Minuartia rosei*) occupies gravelly serpentine barrens and openings in Jeffrey pine/mixed conifer forest between 2500-5800 feet. It is ranked G3 S3.2 meaning there are less than 100 populations worldwide and all are located in California. There are 31 known populations on the Shasta-Trinity National Forest and it is endemic to the Rattlesnake Creek Terrane. There is a large population of Peanut sandwort within the project area, just north of Dubakella Mountain. It is found within Units 32, and 33A.

Olive phaeocollybia (*Phaeocollybia olivacea*) is a gilled fungus that grows in scatters in mixed forests containing oak or pine trees. As with most fungi species little is known about its true distribution and abundance. It is ranked G2, which means there are 6-20 populations worldwide, but the Nature Serve Database documents more than this. The species is uncommon in California (the suspected center of distribution) and Oregon and rare in Washington, with 77 extant occurrences globally, of which 31 lie in currently protected forest reserves. 28 populations are known. It is endemic to the northern spotted owl region in the Pacific Northwest from (possibly) Washington to California. Its patchy distribution precludes estimation of population size and area of occupancy. It is usually found in mixed oak and pine forests, occasionally in pure coniferous stands. The current known populations are relatively stable, but the advent of "sudden oak death" imperils those in mixed forests. No populations are known from Trinity County, although suitable habitat is present in abundance. The closest known population is near Corral Bottom near Big Bar, California.

Pacific fuzzwort (*Ptilidium californicum*) has a North Pacific distribution extending from Japan and the Russian Far East into southeastern Alaska, western British Columbia, Washington, Oregon, Idaho, Montana and reaches the southern edge of its range in northern California. This species has not yet been ranked by Nature Serve or by the CNDDB in California. It is a liverwort that generally occupies the bases of larger white fir and Douglas-fir trees in areas that receive cool and/or moist air. It occurs in mid-elevation late mature DF & WF forests on moist N slopes or near riparian areas. Three populations are known from the west side of the Shasta-Trinity National Forest, with the closest known population being 9 miles southwest near on the East Fork of Smoky Creek. There are no known populations within the project area.

English Peak greenbriar (*Smilax jamesii*) is a perennial vine that occupies moist riparian areas including lakesides, stream banks, alder thickets, and moist slopes in montane forests. It is ranked G2G3S2.3 and is known only from California and Oregon. This rank means there are between 6 to 20 populations and 21-100 populations globally and 6-20 populations within California. It is considered to have no threats statewide, but rationale for this ranking is unclear based on threats identified by Nature Serve. It is found throughout the Klamath and Coast Ranges of northern California between 4000 and 8000 feet. There are 26 known populations on the Shasta-Trinity National Forest and more are suspected, especially in the Trinity Alps Wilderness. The closest known population of English Peak greenbriar is about 25 miles north near Rush Creek.

Orange-peel fungus (*Sowerbyella rhenana*) is a small cup fungus that grows in scattered to gregarious or low-growing groups in duff of moist, relatively undisturbed, older conifer forest. As with most fungi species little is known about its true distribution and abundance. Nature Serve ranks this species as G3G4, which means there are between 21 and 100 populations worldwide. A state rank has not been assigned, but Survey and Manage records indicate there are 18 potential populations in California. There is a single population on the Shasta-Trinity National Forest, about 15 miles northwest near Hayfork Creek.

Effects Analysis

Field surveys in all proposed treatment units were performed in 2007 for Sensitive plants. A single population each of mountain and Brownie lady's-slipper was found in Unit 11. Both populations will be protected by excluding all treatment activities from within the buffered population areas and no impacts will occur to those populations and others within the analysis area, but not within proposed treatments areas. Field surveys for Sensitive fungi must be performed during late fall or winter when soils are cool and moist. Because of the inability to access most potential fungi habitat in the project area during the appropriate survey season due to snow, it was decided to not perform surveys and assume occupancy by branched collybia, olive phaeocollybia, and orange-peel fungus. Project design features would facilitate reduction of potential impacts to these species.

Impacts of No Implementation

There would be no direct effects from the No Action alternative because no treatments would occur. Not implementing the proposed action could increase the possibility of the project area experiencing high-intensity wildfire, which could result in adverse impacts to habitat for branched collybia, olive phaeocollybia, and orange-peel fungus as well as mountain and Brownie lady's-slipper. If no implementation is done the current tree and shrub density levels that have higher fuel loadings and higher fire hazard would be maintained. Fire risk remains the same regardless of the alternative because of the proximity of the project area to frequently traveled roads and the inherent level of lightening activity for that zone. Indirect impacts of higher-intensity wildfire in habitat for Sensitive fungi species include loss of organic matter for moisture retention and nutrients, soil sterilization and temperatures high enough to kill underground reproductive tissues, death of soil microorganisms essential to growth and reproduction of these species, and loss of soil and it's nutrients through erosion. These are the same impacts that could occur in any wildfire; high intensity wildfire is expected to increase the degree of these impacts on plant species.

Habitat for bug-on-a-stick, Shasta pincushion, Pacific fuzzwort, English Peak greenbriar, branched collybia, olive phaeocollybia, and orange-peel fungus occurs in the project area in mature or late seral mixed conifer forested areas. These plant communities have evolved in a

fire-dependent ecosystem (Sawyer and Thornburgh, 1977) so the species may be expected to be able to survive or respond positively to low or moderate-intensity wildfire. High-intensity wildfires were not typical in the Klamath Mountains of California historically and many native plant species are not resilient to impacts of high-intensity wildfire. There is a higher chance of death of native species individuals or populations from lethal soil temperatures that can kill underground reproductive structures. Indirectly, severe modifications in the forest canopy could be great enough eliminate necessary habitat characteristics, such as shade, necessary for native and rare plant species to survive after high-intensity wildfire has occurred.

The Salt project area is identified as being within a low to moderate wildfire risk area for based on risk factors such as lightening starts, presence of roads or developments, and recreation use patterns, but within a high fuel hazard area (SHF Fire Management Plan, 2004). In the absence of high-intensity wildfire within the project area in the future, there would be no direct or indirect effects, therefore no cumulative effects, from the No Action Alternative. Habitat for branched collybia, olive phaeocollybia, and orange-peel fungus would continue to improve as necessary habitat components increase, such as organic matter layers, overstory shade and species richness and diversity.

Habitat for Tracy's wooly-stars, Niles' madia, and Peanut sandwort would remain the same under the No Action Alternative. Habitat for these species is serpentine openings with little fuel to carry fire, so there is little threat of resource degradation from catastrophic fire. Habitat quality for this species would continue to improve with lack of ground disturbance.

Impacts of Alternatives 2 and 3

Sensitive Plant Species

Bug-on-a-stick: No populations are known from the proposed project area under Alternatives 2 and 3. There would be no direct or indirect effects to bug-on-a-stick, therefore no cumulative effects.
Brownie lady's-slipper: The single known population will be excluded from all treatment activities. There will be no direct or indirect effects to Brownie lady's-slipper, therefore no cumulative effects.
Mountain lady's-slipper: The single known population will be excluded from all treatment activities. There will be no direct or indirect effects to Brownie lady's-slipper, therefore no cumulative effects.
Tracy's wooly-stars: No populations are known from the proposed project area under Alternatives 2 and 3. There will be no direct or indirect effects to Tracy's wooly-stars, therefore no cumulative effects.
Niles' madia: No populations are known from the proposed project area under Alternatives 2 and 3. There will be no direct or indirect effects to Niles' madia, therefore no cumulative effects.
Stebbins' madia: No populations are known from the proposed project area under Alternatives 2 and 3. There will be no direct or indirect effects to Stebbins' madia, therefore no cumulative effects.
Peanut sandwort: A single population is known from the proposed project area in the southern end in Units 33A and 32. This population occupies serpentine openings dispersed throughout the 2 units. All subpopulations of Peanut sandwort within Units 33A and 32 will be flagged and excluded from treatment activities, resulting in no direct or indirect impacts to the species, therefore no cumulative effects.

Pacific fuzzwort: No populations are known from the proposed project area under Alternatives 2 and 3. There will be no direct or indirect effects to Pacific fuzzwort, therefore no cumulative effects.

English Peak greenbriar: No populations are known from the proposed project area under Alternatives 2 and 3. There will be no direct or indirect effects to English Peak greenbriar, therefore no cumulative effects.

Sensitive Fungi Species

No surveys were performed for branched collybia, olive phaeocollybia, and orange-peel fungus, but there is approximately 5,990 acres of suitable habitat for all three species present within the project area (as shown in the M3G strata in the GIS database (13-24 foot crown diameters, >70% crown density). Suitable habitat includes mid-to-late seral, late-seral conifer, or mixed conifer/hardwood forest types where species-specific host trees are found as well as adequate amounts of leaf litter and organic debris in the understory. Because of the lack of field surveys and the presence of suitable habitat, occupancy by these three species is assumed for analysis of potential effects. Little or no scientific research has been completed on the impacts from management activities to the three Sensitive fungi, but impacts are thought to be similar to those for common forest fungi. Results of research studies on impacts to these species are available to varying degree and those will be cited where applicable.

Habitat requirements for fungi at their most basic level include organic matter from which nutrients and water are extracted and a host tree for exchange of nutrients (Castellano et al., 1999). Water or moisture is almost always necessary to speed decomposition and to sustain plant biomass that would ultimately provide organic matter. Highest quality habitat in general includes abundant organic matter in the form of litter, duff, and down logs, associated host trees, and shade to provide cool, moist conditions that would facilitate decomposition of organic matter. Disruption of the belowground fungal network from host tree or duff layer removal would disrupt nutrient exchange, and moisture is essential to fungal organisms for survival. Underground fungal networks may go into dormancy when moisture is lacking, but expansion of the mycelium is unlikely to occur and the population would eventually die if dry conditions were sustained over long periods.

Specific habitat requirements for the three species are (Castellano et al., 1999) (Castellano et al., 2003):

- Olive phaeocollybia requires an oak or pine host tree
- Branched collybia (mycoparasite) requires the presence of another fungi species, this is provided in organic debris
- Orange-peel fungus (saprophyte and decomposer) requires decaying litter

Assuming occupancy in the absence of surveys within suitable habitat, impacts may occur to fungi under both alternatives. Direct impacts would include disruption of mycelial networks where machinery used in thinning, road construction, and machine piling churns up soil. Fungi typically fruit only when soil is cool and/or wet. Soil protection and Best Management Practices prohibit treatment activities while soil is wet to prevent compaction. Fungi would not be present above ground during any periods that treatments are occurring, lessening potential impacts to aboveground fungal structures.

Indirect impacts can be longer lasting to fungi than direct impacts. Removal of mature overstory trees in green tree retention (GTR) units would disrupt host tree connections for olive phaeocollybia. As trees are thinned, increased sunlight to the forest floor would dry out the soil and organic layer more quickly, reducing available moisture necessary for fungi growth and reproduction and slowing organic matter decomposition rates.

Plantation Thinning

Plantations offer little habitat for fungi. Treatments to move plantations to later seral stages, 481 acres and 421 acres in Alternative 2 and 3 respectively would improve habitat for the fungi species preferring older forest communities.

Table 5. Treatment Types by Acreage and Alternative

Alternative	Regeneration & Shelterwood - Green Tree Retention	Intermediate Thinning	Hand Fuels Treatment	Maintain Shaded Fuelbreak	Plantation Thinning
Alternative 2	58 acres	963 acres	14 acres	103 acres	481 acres
Alternative 3	30 acres	850 acres	14 acres	100 acres	421 acres

Intermediate Thinning

The proposed action would perform thinning treatments on between 850 and 963 acres under both alternatives (Table 5). The proposed action would not reduce canopy cover below 50% on average in any treatment units in Alternative 2; and it would not be reduced below 60% in Alternative 3. Thinning from below would retain the largest trees to provide shade for ground-floor moisture retention that would contribute to organic matter accumulation, which provides a substrate for branched collybia and orange-peel fungus and a source of fungal species biomass for reinoculation of disturbed soils in the project area. Retention of the largest trees would insure retention of an adequate number of host trees for olive phaeocollybia.

There is no information available on the exact amount of time branched collybia, olive phaeocollybia, and orange-peel fungus require to recover from minor, moderate or heavy impacts. However, that information is not necessary to analyze the effects of this project because retention of habitat elements such as organic matter, shade, and host trees would insure that at least a minimum of each of these elements is available after treatments for potential populations of the three species to survive within the treatment unit.

Green Tree Retention (Shelterwood and Regeneration)

Shelterwood and regeneration harvests with retention of 15% of the acres would occur on 10 acres under Alternative 2 and in unit 37 (Table 5). Where overstory removal occurs on 2 acres or less, recovery of the three fungi species may be expected to occur if regenerative inoculant material is provided from adjacent stands with the species present. Recovery is not expected to occur rapidly in larger overstory removals because there is greater chance of eliminating the entire organism (if original patch size is small) and because of the larger area of residual unsuitable habitat conditions. Thus is expected to be a temporary effect as overstory trees would be retained and design criteria to protect forest soils have been developed for this project. As the trees fill in and shade develops from trees reaching mid-seral states, re-colonization by forest fungi is expected.

Harvesting Methods

Table 6. Treatment Methods by Acreage and Alternative

Alternative	Tractor	Helicopter	Non-mechanical/hand treatment
Alternative 2	986 acres	138 acres	495 acres
Alternative 3	867 acres	113 acres	435 acres

Helicopter systems would be used to remove timber on 138 acres in Alternative 2 and 113 acres in Alternative 3 (Table 6). Helicopter yarding causes little or no impact on soil and would result in no impacts to any potential Sensitive fungi populations.

Fuelbreak maintenance and plantation thinning may be accomplished non-mechanically or mechanically. Like helicopter treatments non-mechanical treatments are expected to only create limited superficial effects to soil and fungi. However since mechanical treatments by mastication could occur, more effects can be anticipated than by hand treatments. Treatments by masticators are not as disturbing to soil compared to ground-based logging because the masticated material is typically driven on as the machine proceeds. As a result the machine leaves limited disturbed soil, soil design criteria prevent machines from working when significant soil compaction could occur, and a mulch layer of masticated shrubs is generated further benefiting soil fungi.

Tractors would be used to harvest timber on 986 acres in Alternative 2 and 867 acres in Alternative 3 (Table 6). Within the originally considered units, 278 acres have suitable habitat for Sensitive fungi. Due to project development and units no longer being considered for treatment, 10 acres total in Unit 37 could be treated in Alternative 2 and none in Alternative 3. Tractors can impact fungi populations through soil compaction and disruption of the organic matter layer on the forest floor where most of the fungal mass is present.

Tractors can cause soil compaction when they operate on wet soil, which reduces soil porosity, restricts movement of oxygen and water through soil, and reduces the pore space for root penetration and production of feeder rootlets where mycorrhizae form (Amaranthus, 1996). All tractor work under the proposed action would proceed during the period of operability, mid-May to mid-October unless a more restrictive operating period is warranted. The period of operability occurs when soils are below maximum soil moisture content. This ensures soil porosity would not be reduced more than the Region 5 Standard of 10 percent (FSH 2509.18). Working within the period of operability would ensure no Sensitive fungi habitat is lost from tractor activities.

Most of a fungal organism is contained in the upper duff layers of forest stands. As tractors move through stands and haul logs, the duff layer can be disrupted, resulting in disruption of nutrient exchange and accelerated soil drying. Extended periods of soil moisture are essential to fungal organisms for reproduction and expansion. When habitat conditions become unfavorable temporarily, fungi have the ability to go into dormancy (i.e. during dry summer months), but over periods longer than a single dry season the organism may lose viability and die because of lack of nutrients and inability to regenerate.

There is no difference between Alternatives 2 and 3 in the amount of suitable habitat for branched collybia, olive phaeocollybia, and orange-peel fungus in the analysis area. Mitigations to retain soil organic matter in treated stands (FSH 2509.18) would result in retention of at least 50 percent of organic matter on a site. This would not minimize or eliminate disruption of the organic layer, but retain organic matter that would be available for reinoculation of future organic matter as it

accumulates. Retention of 50 percent overstory cover would encourage maintenance of necessary, minimum humidity levels in duff and soil.

Post-Activity Fuel Treatments

Slash-pile burning would occur on 150 acres, and result in localized areas of high soil heating under the piles. With standard operating procedures machine-made piles would generally be no greater than 8 feet by 12 feet in diameter on average and hand piles would not exceed 4 feet by 6 feet on average. High soil temperatures are thought to be restricted to the top 5 centimeters (2 inches) of soil, while fungal and plant root biomass can reach much lower depths (Visser, 1995; Smith et al., 2004). Recovery and reintroduction of any populations of branched collybia, olive phaeocollybia or orange-peel fungus is expected from residual fungal biomass in the areas surrounding burn piles.

Tractors would be used to pile slash within the project area, but habitat for Sensitive fungi occurs on 10 acres within Alternative 2. Project design features would keep soil compaction below levels that would adversely affect Sensitive fungi, but organic matter layers would be disrupted. Retention of at least 50 percent of organic matter at each site would accelerate recovery time for fungi species and amounts.

Shaded Fuel Break Thinning

Fuel breaks offer little habitat for the fungi. A shaded fuelbreak along the west edge of the project area would be re-established. Shrubs and small diameter trees would be removed and larger-diameter trees would be thinned to an overstory canopy of around 40 percent in Alternative 2. In Alternative 3, 60 percent canopy cover would be retained in the fuelbreak, as well as in all other thinning units. This fuelbreak is located along the highest ridgeline in the project area. It is more exposed because of its elevation and does not provide a high degree of suitable habitat for branched collybia, olive phaeocollybia, or orange-peel fungus. Therefore few, if any impacts are expected to the species from fuelbreak construction and opening of the canopy.

Road Construction and Decommissioning

There are no differences in miles of roads between the two action alternatives. No new system road construction would occur under either alternative.

In Alternative 2 and 3, approximately 17.1 miles of roads would be reconstructed, and 13.8 miles of existing roads would be decommissioned as funding is available. Decommissioning actions include ripping, pulling pipes, adding water bars, and out-sloping after completion of project activities. There is no suitable habitat for branched collybia, olive phaeocollybia or orange-peel fungus because these existing roads are heavily compacted, and therefore no impacts to these species. Decommissioning roads and trails would accelerate the recovery of potential suitable habitat for Sensitive fungi when completed by ripping, which would reduce compaction and increase soil porosity, and through reintroduction of species diversity. A reduction of bulk density can take up to 45 years without ripping while organic matter accumulates and soil microorganisms are reintroduced; recovery time for recapturing suitable fungi habitat should decrease with ripping (Froelich et al.1985)

About 58 landings would be used in Alternative 2 and 20 in Alternative 3, occupying up to 14 and 5 acres respectively. About 39 of the landings would be newly constructed in Alternative 2 and 9 in Alternative 3 occupying 10 and 2 acres respectively. There is no suitable habitat for branched collybia, olive phaeocollybia or orange-peel fungus because the existing landings are compacted and new landings would be constructed in disturbed areas, and therefore no impacts to these

species. Landings would be seeded and mulched, and if necessary ripped and obliterated at the end of the project, allowing them to recover from disturbance from the proposed action and past actions.

In Alternative 2, temporary road construction would occur in areas that have not been previously disturbed. Temporary road construction would disturb 0.3 miles (about 0.54 acres), or less than 1 percent of the treatment acres, all within mid-mature conifer stands, and would be ripped and closed at the end of the project, reducing soil compaction. There would be no impact to Sensitive fungi because roads are proposed for areas outside of suitable habitat.

Cumulative Impacts

Similar spatial and temporal boundaries were used for branched collybia, olive phaeocollybia, and orange-peel fungus because they all have similar growth patterns and habitat characteristics. Habitat characteristics for the three species include mature to late-seral forest, true fir or Douglas-fir host trees, an overstory canopy of at least 50 percent to provide shade for moisture retention and timely organic matter decomposition, and a diversity of understory vegetation to provide underground fungal diversity (Castellano, 1999; Castellano, 2003). There are no known present or future actions outside of the proposed action that could negatively influence these species. There are currently approximately 5,990 acres of potential suitable habitat (GIS database M3G, or M4G Strata for Douglas-fir or mixed conifer types) for branched collybia, olive phaeocollybia, and orange-peel fungus in the Salt Creek 5th field watershed and between 14 and 24 acres of suitable habitat within treatment units, depending on the action alternatives.

Temporal Boundary

All activities occurring from approximately 80 years in the past to approximately 80 years into the future would be considered to contribute to cumulative impacts to branched collybia, olive phaeocollybia, and orange-peel fungus. 80 years is about the time it would take mature or late-seral forest communities to develop habitat characteristics that are minimally suitable for the 3 fungi species to survive in healthy populations in the project area once more. Although stand development rates would vary depending on local conditions, the Northwest Forest Plan (USDA, 1994) identifies old-growth forest conditions commencing in Northwest Forest Plan Forests at 80 years old.

Spatial Boundary

It is difficult to determine spatial boundary, the most important factor that influences healthy fungi populations. Influences include a diverse underground fungal community that comes with stand age, species aboveground diversity to provide multiple host species and organic matter inputs, and adequate moisture to grow the plants necessary to create the first two factors listed. The most reasonable spatial boundary for analysis may be the 5th field watershed that contains close to the entire project area (Salt Creek). This watershed determines the scope of the subsurface hydrology, which is one of the driving factors in plant community composition. The geographic extent of the watershed is 36,328 acres.

Relevant Past, Present, and Reasonable Foreseeable Future Actions

The Cumulative Effects Summary Table 7 identifies known environmental actions that have occurred in the 5th field watersheds including the project area (Salt Creek Headwaters and Ditch Gulch). Only some of these actions have contributed to modification of suitable habitat for Sensitive fungi. Actions that are relevant are those that occurred in habitats that currently do not provide suitable habitat for Sensitive fungi but are thought to have prior to the action, based on

residual habitat types and knowledge of past treatment prescriptions. Existing habitat conditions reflect the results of the past actions and events and contribute to the cumulative impacts.

Timber Harvest

The species composition of previously harvested stands is unknown, but historically commercial timber harvest (regeneration) on the Shasta-Trinity National Forest has focused on Douglas-fir, mixed conifer, and ponderosa pine habitat types within mature or late-seral forest communities. GIS records indicate the presence of only a minor amount of single species ponderosa pine habitat types in the Salt Creek watershed, so it may be safe to assume past harvests were in mature or late-seral Douglas fir or mixed conifer habitat types. These habitat types provide suitable habitat for Sensitive fungi. Machine piling and pile burning activities may or may not have occurred after harvest activities, but all piling and burning would have occurred within units that also received impacts from overstory removal.

Using the GIS database, there are 3243 acres of conifer plantations within the Salt Creek watershed. This figure was used as a surrogate for timber harvest history (clearcuts) within the watershed. Adding this to the acres of current suitable habitat for Sensitive fungi (5990 acres) would indicate a total of 9233 acres of available suitable habitat in the Salt Creek watershed over the past 80 years. Past timber harvest would account for disturbance to 35% of the suitable habitat in the watershed.

Records are unclear on the amount of overstory retained with commercial thinning, as is information about the location of past commercial thinnings in relation to past timber sales identified in the Cumulative Effects Summary Table in the EIS. In the absence of information, retention of less than 50% overstory canopy and independent locations of commercial thinnings are assumed. Assuming average stand age of commercially thinned timber to be no younger than 60 years at the time of thinning, with only 20 years of growth required to bring the stand to the minimum mature timber age of 80 years, only commercial thinnings after about 1985 would not have recovered the minimum habitat characteristics necessary to support healthy Sensitive fungi populations.

Wildfire

Three wildfires have occurred within the past 80 years in the Salt Creek watershed, burning approximately 7,470 acres. The smallest at 101 acres burned just outside the southern end of the proposed project area, but none burned within the project area. The two largest fires burned at the far north end of the watershed, well away from the proposed project area. All fires burned very hot, primarily because they all burned in early to mid-seral mixed conifer or ponderosa pine/hardwood habitats where abundant ground fuels were present and because drought had been occurring in their recent history. None of these areas burned currently provide habitat for Sensitive fungi.

No other past actions are thought to have reduced suitable habitat for Sensitive fungi.

Discussion

Effects to forest fungi have occurred across the watershed. These effects cumulatively can negatively affect fungi by reducing available habitat. There are a total of 9,233 acres of potential habitat for the branched collybia, olive phaeocollybia, and orange-peel fungus in the watershed when considering currently available and suitable habitat combined with past available habitat. Impacts from past timber harvests, machine piling, pile burning have occurred on 3,243 acres of suitable habitat within the Salt watershed. Planned activities under the Salt Project would occur

on 3,267 and 3,253 acres in Alternative 2 and 3 respectively. Several different types of treatments would occur under either alternative including tractor harvest, site prep, and fuels reduction. The actual number of acres of suitable habitat impacted by treatments under the proposed action is between 14 and 24 acres. These areas are largely comprised of areas such as burn piles and skid trails.

Past actions have contributed to modification or loss of 35% of the suitable habitat within the watershed. The Proposed Action would contribute to negative impacts on an additional 14 to 24 acres. In relation to the total amount of past and present suitable habitat for Sensitive fungi, the proposed action would contribute to an additional 0.15% in Alternative 2 and 0.25% in Alternative 3 of impacts to habitat for branched collybia, olive phaeocollybia, and orange-peel fungus. This incremental change is not sufficient to threaten the viability of the three species.

Several mitigation measures have been incorporated into the project design to minimize impacts to natural resources within the project area. The following measures, when applied on suitable habitat, would reduce impacts to and benefit branched collybia, olive phaeocollybia, and orange-peel fungus. As a result effects could occur on 10 acres in Alternative 2, but with the soil protection design criteria in place the effects are not expected to be on all 10 acres or be long-term.

Soil productivity standards described in Forest Service Handbook 2509.18 (2.2.1 Soil Productivity) require maintenance of 50% fine organic matter cover, preferably undisturbed and where capability exists, and at least 5 well distributed logs per acre in a range of decomposition classes, reduction of soil porosity to not less than 10% of natural conditions, and retention of organic matter in amounts sufficient to prevent significant sort or long-term nutrient cycle deficits.

The Shasta-Trinity National Forest Land and Resource Management Plan Appendix G lists minimum requirements for down and woody material left on site after treatments to be no less than 5 tons per acre for most target wildlife species.

The Aquatic Conservation Strategy of the Northwest Forest Plan remains unchanged with the 2004 decision to remove Survey and Manage mitigations. Strategy Objectives #8 requires maintenance and restoration of species composition and structural diversity of plant communities in riparian areas and wetlands to provide several hydrologic functions including nutrient filtering, limiting surface erosion, and sustaining physical complexity and stability. Objective #9 requires maintaining and restoring habitat to support well-distributed populations of native plant, invertebrate and riparian-dependent species. Both objectives work to minimize disturbance and disruption of belowground fungal networks in riparian areas where fungi are most likely to grow on the Shasta-Trinity National Forest and both objectives would be met with implementation of either Alternative 2 or 3.

Past, present, and reasonably foreseeable activities have resulted in impacts to 3243 acres of suitable habitat in the Salt Creek watershed. Relative to past actions, proposed disturbance actions would result in an additional 24 acres or 0.15% in Alternative 2 and 14 acres or 0.25% in Alternative 3 of the suitable habitat in the Salt Creek 5th Field watershed and mitigation measures would be employed to lessen project impacts on fungi habitat. In total, the proposed action in addition to past actions is not expected to exceed viability thresholds for branched collybia, olive phaeocollybia, and orange-peel fungus or have any significant effects on the three species.

Table 7. Past Present, and Reasonably Foreseeable Actions in the Watershed Affecting Suitable Habitat for Sensitive Plants and Fungi

Watershed Name	Past Projects (completed prior to January 2007) Note that different activities may occur on the same acreages; therefore, the total acres affected is not a total of the activities listed.	Present Projects	Foreseeable Projects (January 2007 to December 2012)
Headwaters of Salt Creek (9,760 acres) 7th field HUC	Precommercial Thinning: 176 ac. 1977-2006	none	13.7 ac FY Planned 2008
	Roadside Fuels/ Fuelbreaks: Phone FMZ 44 acres in 1994	none	none
	Mechanical site preparation and piling of activity fuels: 304 acres 1977-1986; 22 acres 1987-1996	none	none
	FS Timber Harvest: patch clearcut 37 acres from 1957-1966; patch clearcut 364 acres from 1977-1986; patch clearcut 118 ac sanitation salvage 75 ac from 1987-1996; salvage cut 36 acres from 1997-2006	none	none
	Private Timber Harvest	No Timber Harvest Plans on file with CDF	No Timber Harvest Plans on file with CDF
	FS Road Construction	none	none
	Private Road Construction	none	none
	Wildland Fire by decade: TOTAL = 284 acres as follows: pre-1920 = 2; 1920s = 100; 1930s = 42; 1940s = 1; 1950s = 1; 1960s = 1; 1970s = 5; 1980s = 127; 1990s = 5; plus 40 fires less than 1 acre each from 1920-2000	none	none
	Burning Activity Fuels - 109 acres from 1977-1996; 83 ac. 1987-1996	none	none as planned in FACTS
	Chipping Activity Fuels - 36 acres from 1997-2006	none	none as planned in FACTS
	Domestic Water Use	Domestic Water Use	Domestic Water Use
	Grazing (3200 acres with 270 AUMs) majority of use in Dobbins Gulch area. When permitted, area meets standards. (Salt Creek Allotment)	presently a vacant allotment	Grazing (3200 acres with 45 AUMs) [1]
	Utilities: 2.6 miles of underground gas pipeline; 3.4 miles of 115K powerline @ 75 feet width; 4.8 miles of Distribution powerline	none	none
	Historic placer and strip mining (no effects)	none	none
Ditch Gulch (5,077 acres) 7th field HUC	Precommercial Thinning: 135 acres 1987-2006	none	none as planned in FACTS
	Roadside Fuels/ Fuelbreaks: Post Mountain 78 acres in 2006	none	none
	Mechanical site preparation and piling of activity fuels: 646 acres 1977-1986; 6 acres 1987-1996	none	none as planned in FACTS
	FS Timber Harvest: patch clearcut 420 acres 1977-1986, 10 acres 1987-1996; salvage cut 57 acres 1997-2006	none	none as planned in FACTS for timeframe specified

Watershed Name	Past Projects (completed prior to January 2007) Note that different activities may occur on the same acreages; therefore, the total acres affected is not a total of the activities listed.	Present Projects	Foreseeable Projects (January 2007 to December 2012)
	Private Timber Harvest	No Timber Harvest Plans on file with CDF	No Timber Harvest Plans on file with CDF
	FS Road Construction	none	none
	Private Road Construction	none	none
	Wildland Fire : TOTAL = 62 Acres as follows: 1918 = 60 acres; 1990s = 2 acres; 15 other fires < 1 acre each	none	none
	Burning Activity fuels: 94 acres from 1977-1996	none	none
	Chipping Activity Fuels - 57 acres from 1997-2006	none	none
	Domestic Water Use	Domestic Water Use	Domestic Water Use
	Grazing (500 acres with 100 AUMs) Post Creek Allotment.	Grazing - 500 acres with 20 AUMs	Grazing (500 acres with 20 AUMs) [2].
	Utilities: 2.5 miles of 115K powerline; 2.3 miles of underground gas line	none	none
	Historic placer and strip mining (none)	none	none
Rattlesnake portion of fuelbreak (52 acres)	Fuelbreak Construction	Fuelbreak Maintenance	Fuelbreak Maintenance

References

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Appendix A: Sensitive Plant Species Known or Suspected to Occur on the Trinity National Forest and Probability of Occurrence within the Proposed Project Area

Table 1./Appendix A. Sensitive Plant Species Known or Suspected to Occur on the Trinity National Forest and Probability of Occurrence within the Proposed Project Area.

This includes Big Bar, Hayfork, Weaverville, & Yolla Bolla Ranger Districts, 10/1/2007. Species eliminated from further consideration in this project BE are indicated and explained in table.

Species	Possibly Occurring (Y/N)	Habitat & Reason for non-consideration (in bold)
Arnica venosa veiny arnica endemic	N	Mixed conifer or conifer/oak forest, especially on ridgetops & old road cuts. 2000-5200 feet elev. Trinity & Shasta Cos. **Out of geographic range**
Botrychium minganense mingan moonwort sensitive	N	Alder thickets, high quality riparian areas. 1000-6000 feet elev. **No suitable riparian habitat**
Botrychium montanum mountain grapefern sensitive	N	Alder thickets, high quality riparian areas. 1000-6000 feet elev. **No suitable riparian habitat**
Botrychium pinnatum northwestern moonwort sensitive	N	Alder thickets, high quality riparian areas. 1000-6000 feet elev. **No suitable riparian habitat**
Buxbaumia viridis bug-on-a-stick (moss) sensitive	Y	Large diameter, advanced decay logs in riparian habitat in conifer forest. Low elevation to alpine.
Campanula wilkinsiana Wilkins' harebell sensitive	N	Streambanks &springs in red fir and subalpine forests; 5500-8600 feet elev. **Too low in elevation**
Chaenactis suffrutescens Shasta pincushion sensitive	Y	Rocky open slopes, cobbly river terraces; on ultramafic soils or glacial till w/ ultramafics included. 2600-6900 feet elev. Eastern Klamath Ranges of CA.
Collybia racemosa branched collybia sensitive	Y	Nutrient rich leaf mulch or decaying fungi in conifer forest; all elevations.
Clarkia borealis ssp. borealis northern clarkia sensitive	N	Foothill woodlands and forest margins. 1300-2600 feet. Eastern Trinity and W. Shasta Co. **Out of geographic range**
Cypripedium fasciculatum Brownie lady's slipper sensitive	Y	Mixed conifer or oak forests on a variety of soil types, often but not always associated with streams; 1300-6000 feet elev. Widespread but sporadic.

Species	Possibly Occurring (Y/N)	Habitat & Reason for non-consideration (in bold)
Cypripedium montanum mountain lady's slipper sensitive	Y	Mixed conifer or oak forests on a variety of soil types, often but not always associated with streams; 1300-6000 feet elev. Widespread but sporadic.
Cudonia monticola sensitive	N	On spruce needle mats and coniferous debris. All elevations. **Requires moister habitats than that found in the project area**
Draba carnosula Mt. Eddy draba sensitive	N	High elevation ridges and summits on rocky ultramafic soils. 6000 to 9000 feet. **Too low in elevation.**
Epilobium oreganum Oregon willow herb sensitive	N	Wet, gently sloping stream banks, meadows, & bogs, generally on ultramafic soil. 500-7800 feet elev. Klamath Ranges of CA & OR. **No wet meadows present**
Eriastrum tracyi Tracy's woolly-stars sensitive	Y	Dry gravelly to loamy soils on flats and benches; closed cone pine forests or chaparral. 1000 to 4300 feet elev. North Coast Ranges.
Ericameria ophitidis (= Haplopappus ophitidis) serpentine goldenbush endemic	Y	Serpentine semi-barrens or openings in Jeffrey pine-incense cedar woodland. 2600-5600 feet elev. Rattlesnake Creek Terrane (M261Au) & Chanchelulla Peaks of the southern Klamath Ranges.
Eriogonum libertini Dubakella Mountain buckwheat endemic	Y	Openings in Jeffrey pine-incense cedar woodland or chaparral, always on ultramafic soils. 2500-5500 feet elev. Rattlesnake Creek Terrane (M261Au) & Chanchelulla Peaks of the southern Klamath Ranges.
Eriogonum ursinum var. erubescens blushing wild buckwheat sensitive	N	Rocky openings on open ridgelines in the Klamath Range. 5300-6200 feet. **Too low in elevation**
Frasera umpquaensis (=Swertia fastigiata) Umpqua green gentian sensitive	N	Cool, moist Douglas-fir/white fir forest margins or openings. 5000-6000 feet elev. South Fork Mountain, Trinity Co., & SW OR. **Out of geographic range**
Erythronium citrinum var. roderickii Scott Mountain fawn lily sensitive	N	Mixed conifer forest on ultramafic or granitic soils. 2900-4000 feet elev. Trinity & Scott Mountains. **Out of geographic range**
Iliamna bakeri Baker's globe mallow sensitive	N	Chaparral, pine or mixed conifer/oak forest, juniper woodland; on rocky soil, 3800-6800 ft. elev. Scott Mtn., Cascades & Modoc Plateau. **Out of geographic range**
Iliamna latibracteata California globe mallow sensitive	N	Coniferous forest and streamsides in the Klamath Range. 1600-6600 feet. South Fork Mtn. **Out of geographic range**

Species	Possibly Occurring (Y/N)	Habitat & Reason for non-consideration (in bold)
Ivesia pickeringii Pickering's ivesia sensitive	N	Ephemeral drainages & seasonally wet grassy slopes in mixed conifer forest, on ultramafic soils. 2500-4500 feet elev. Scott Mountain & Trinity Mtns. **Out of geographic range**
Leptosiphon nuttallii ssp. howellii Tedoc Mountain linanthus sensitive	N	Jeffrey pine/incense cedar forest, usually on ultramafic soil. 4000-5000 feet elev. Localized around the base of Tedoc Mountain, Tehama Co. **Out of geographic range**
Harmonia doris-nilesiae Niles' madia sensitive	Y	Rocky ultramafic ridgetops & slopes with Jeffrey pine, gray pine, & shrubs. 2100-5500 feet elev. Rattlesnake Creek Terrane (M261Au) of southern Klamath Ranges.
Harmonia stebbinsii Stebbins' madia sensitive	Y	Rocky ultramafic semi-barrens with Jeffrey pine, gray pine, & shrubs. 2100-6000 feet elev. Southern Klamath Ranges & Inner N Coast Ranges.
Mielochheferia elongata copper moss sensitive	N	Exposed soil or rock containing copper minerals (in the Klamath Range). Roadcuts. All elevations. **No copper minerals present**
Minuartia rosei Peanut sandwort sensitive	Y	Gravelly serpentine barrens & openings in Jeffrey pine/mixed conifer forest. 2500-5800 feet elev. Rattlesnake Creek Terrane (M261Au) of southern Klamath Ranges.
Minuartia stolonifera Scott Mountain sandwort sensitive	N	Rocky slopes on ultramafic soils; montane mixed conifer forest. 4100-5300 feet elev. Scott Mountain. **Out of geographic range**
Montia howellii Howell's montia sensitive	N	Vernally, wet sites, often on compacted soil. Below 1350 feet. Coastal and Klamath Mountains. **No vernally wet sites**
Parnassia cirrata var. intermedia fringed grass-of-parnassus sensitive	N	Wet areas, lake edges in ultramafic soils. Below 3000 feet. Eastern Klamath Ranges. **Out of geographic range**
Penstemon filiformis thread-leaf beardtongue sensitive	N	Rocky openings in lower montane conifer forest on ultramafic soils. 2000-6000 feet elev. Trinity Mountains, east side of Billy's Peak. **Out of geographic range**
Phacelia greenei Scott Valley phacelia sensitive	N	Gravelly serpentinized slopes & forest openings. 5000-7000 feet elev. Scott Mountain. **Too low in elevation**
Phaeocollybia olivacea olive phaeocollybia sensitive	Y	Mixed conifer forest containing oak or pine. All elevations.
Ptilidium californicum Pacific fuzzwort sensitive	Y	Large-diameter Douglas fir or white fir, 4000 to 5000 feet elev.
Raillardella pringlei showy raillardella sensitive	N	Wet ultramafic meadows, seeps and streambanks. Elev. 4000-7500 feet. Klamath Ranges **Too low in elevation**

Species	Possibly Occurring (Y/N)	Habitat & Reason for non-consideration (in bold)
Raillardiopsis scabrida rough raillardella sensitive	N	Rocky, open subalpine slopes. 5500-7500 feet elev. North Coast Ranges & southern Cascades. **Too low in elevation**
Sedum paradisum (=Sedum obtusatum ssp. p.) Canyon Creek stonecrop sensitive	N	Rock outcrops in forest or woodland openings. 960-6500 feet elev. Southern Klamath Ranges of CA. **No large rock outcrops impacted**
Smilax jamesii English Peak greenbriar sensitive	Y	Shaded riparian habitat above 2900 feet. Klamath & Cascade Ranges.
Sowerbyella rhenana orange-peel fungus sensitive	Y	Duff of moist, undisturbed, older conifer forest. All elevations.

Appendix B: Supplemental Botanical Report

Introduction

The purpose of this report is to describe management direction for botanical aspects of the proposed project other than threatened, endangered, and sensitive plants if they are present.

Summary of botanical concerns for the Salt Project, other than those addressed in the attached Biological Evaluation:

1. Forest Plan Endemics
2. Survey and Manage Species
3. Watchlist plants – none present in the project area, no discussion to follow.

Current Management Direction and Affected Environment

Forest Plan Endemic Species

Endemic plants are rare species confined wholly or mostly to the Shasta-Trinity National Forest. These species are not included on the Regional Forester's Sensitive Species List, but are of local conservation concern because they are considered highly endemic to the area and rare. Three Forest Plan Endemics described in the Forest Plan occur on the Trinity National Forest, Dubakella Mountain buckwheat (*Eriogonum libertini*), serpentine goldenbush (*Ericameria ophitidis*), and veiny arnica (*Arnica venosa*). Veiny arnica is not known from the geographic area that includes the proposed project area and is not of concern for this project. Forest Plan direction is to afford the same protection to Forest Plan Endemics as to Sensitive species.

Impacts of No Implementation

If the proposed action were not to be implemented, there would be little or no change for existing populations of Dubakella Mountain buckwheat or serpentine goldenbush. Both species occupy open sites with little or no vegetation or woody fuel to carry fire, so catastrophic fire is not a threat. Known populations would continue to grow on stable sites. Habitat around populations of serpentine goldenbush that occupy historically disturbed soils would continue to recover and improve.

Impacts of Alternatives 2 and 3

There are 13 known populations of serpentine goldenbush and 10 known populations of Dubakella Mountain buckwheat based on historic population records and results of the 2007 botany field surveys. Both species are known exclusively from the southern half of the Rattlesnake Creek Terrane on the South Fork Management Unit. One or more populations of serpentine goldenbush are found in Units 14, 17, 18, 22, 30A, 32, 45, and on the border of/just outside unit 1 in Alternative 2 and in Units 14, 17, 18r, 22r, 30A, 32r, 45r and on the border outside of unit 1r. One or more populations of Dubakella Mountain buckwheat are found in Units 21, 22, and 45 in Alternative 2 and in Units 21r, 22r, and 45r in Alternative 3. Additional populations of each species are found outside of proposed treatment units and these will be unaffected by the proposed action.

Dubakella Mountain Buckwheat

Because of uncommonness and individual population numbers of Dubakella Mountain buckwheat, all populations in Units 21, 22, and 45 in Alternative 2 and Units 21r, 22r, and 45r in Alternative 3 will be excluded from all treatments utilizing tractors. Dubakella Mountain buckwheat occupies open serpentine habitats that have few, if any trees, and typically few hazardous fuels to carry fire. Exclusion of treatments on populations found in these units would have little impact on effectively reducing hazardous fuels overall in the project area. Exclusion of treatments within Dubakella Mountain buckwheat populations will result in no impacts to the species. Populations of this species found outside of proposed treatment units, but are within the analysis area would be fully protected from impacts. There would be no direct or indirect impacts to Dubakella Mountain buckwheat, therefore no cumulative impacts.

Serpentine goldenbush

Serpentine goldenbush, although a regional endemic, is found in greater abundance and on a wider range of habitats than Dubakella Mountain buckwheat. The species occupies Jeffrey pine/incense cedar woodlands as well as serpentine outcrops without overstory trees. It can often be found on soils that have been disturbed historically, such as old roads and skid trails, but it is always found on serpentine soils. Because of the greater abundance throughout it's range, large number of populations within the proposed project area, and its apparent affinity for disturbed sites, the species is capable of receiving some impacts without threatening it's viability.

Four populations distributed within Units 14, 17, 18, 22, 30A, 32, 45, and on the border of/just outside unit 1 in Alternative 2, and Units 14, 17, 18r, 22r, 30A, 32r, and 45r on just outside unit 1r in Alternative 3 would be excluded from all treatments utilizing tractors.

Adjacent areas would be disturbed and may provide habitat to recruit seedlings. Serpentine goldenbush prefers full sun for growth. As thinning treatments reduce the canopy, habitat for the species should improve.

Populations of this species found outside of proposed treatment units, but are within the analysis area would be fully protected from impacts. There would be no direct or indirect impacts to serpentine goldenbush, therefore no cumulative impacts.

Survey & Manage Vascular Plants, Bryophytes, Lichens, & Fungi

Forestwide standards and guidelines for "Survey & Manage" old-growth associated species were revised in January 2001 and described in Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures, Standards and Guidelines (2001). Survey and Manage categories were redefined based on species characteristics and relative rarity. Species were grouped as either Rare or Uncommon, and by need for pre-disturbance surveys prior to ground disturbing activities. Ten species requiring pre-disturbance surveys are considered to have suitable habitat within northern California:

Table 1./Appendix B. Survey & Manage Plants Requiring Pre-disturbance Surveys

Scientific Name	Common Name	Plant type
Ptilidium californicum	Pacific fuzzwort	non-vascular/liverwort
Tetraphis geniculata	--	non-vascular/moss
Schistostegia pennata	goblin's gold	non-vascular/moss
Buxbaumia viridis	bug-on-a-stick	non-vascular/moss

Scientific Name	Common Name	Plant type
Cypripedium montanum	mountain lady's-slipper	vascular plant
Cypripedium fasciculatum	fascicled lady's- slipper	vascular plant
Botrychium minganense	Mingan moonwort	vascular plant
Botrychium montanum	mountain moonwort	vascular plant
Eucephalis vialis	wayside aster	vascular plant
Leptogium cyanescens	--	lichen

Habitat within the planning area ranges from early seral conifer plantations to late seral Douglas fir or mixed conifer forest. Non-conifer habitat types, primarily montane shrubs, chaparral, and oak woodlands occupy about 13% of the area. Perennial riparian reserves that would provide suitable habitat for all of the above species except for *Eucephalis vialis* are present in the proposed project area.

All the Survey and Manage species listed above are also R5 Sensitive species with the exception of *Tetraphis geniculata, Schistostegia pennata, Eucephalis vialis,* and *Leptogium cyanescens*. Effects to species that are also Sensitive species were analyzed in the biological evaluation. Field surveys for all Survey and Manage plant species were conducted concurrent with Sensitive plant surveys.

No populations of the species listed above were found during field surveys and there are no known documented populations in the project area. All species occupy habitat that is late seral in general, although mountain lady's-slipper has been found in mid-seral conifer forest with late-seral remnants. *Tetraphis geniculata* and *Schistostegia pennata* occupy large, decomposed logs or large, moist root wads within coastal habitats that are moister than those found on the Shasta-Trinity National Forest. To date, none of these species is known from the Shasta-Trinity National Forest.

Impacts of No Implementation

Because there are no populations of any Survey and Manage species or no suitable habitat, there would be no effects to these species from the No Action alternative.

Impacts of Alternatives 2 and 3

There would be no impacts to Survey and Manage species because of lack of individuals in the project area or lack of suitable habitat. In the absence of direct or indirect impacts there would be no cumulative impacts. The Salt Project is in compliance with the 2001 Survey and Manage ROD.

Pre-Field Review - Survey and Manage Plant Species

Table 2./Appendix B. Pre-field Review for Survey and Manage Plant Species

Species	Habitat Characteristics	Known Range in California	Known Sites Within Vicinity of Project Area?	Potential Habitat Present?
Ptilidium californicum	Large-diameter fir or white fir, 3000 to 5000 feet	California Klamath Province	No	Yes
Tetraphis geniculata	Decay Class 3 or 4 logs and stumps in shady, moist forest	California Klamath Province	No	No
Cypripedium fasciculatum	Mesic conifer and/or hardwood forest, especially riparian zones	California Klamath Province	Yes	Yes
Cypripedium montanum	Mesic conifer and/or hardwood forest, especially riparian zones	California Klamath Province	Yes	Yes
Schistostegia pennata	Moist rootwads in shady coniferous forest	California Klamath Province	No	No
Buxbaumia viridis	Large decay class 3 or 4 logs in streams in coniferous forest	California Klamath Province	No	Yes
Botrychium minganense	Edge of willow thickets in coniferous forest	California Klamath Province	No	No
Botrychium montanum	Edge of willow thickets in coniferous forest	California Klamath Province	No	No
Leptogium cyanescens	bark or moss on bark of black oaks	Six Rivers National Forest	No	Yes
Eucephalus vialis	grassy, fire-disturbed openings, sometimes within conifer forest	suspect in California Klamath Physiographic Province	No	No

Appendix C. Noxious Weeds

Introduction

The Chief of the Forest Service identified invasive species as one of four threats to National Forest lands. As a result, the Forest Service developed a policy for the prevention of the introduction and establishment of non-native plant species. This policy and other supporting documentation direct the Forest Service to: 1) determine the factors that favor establishment and spread of invasive plants, 2) analyze NNIS risks in resource management projects, and 3) design management practices that reduce these risks.

Current management direction for management of noxious weeds is given in FS Manual 2080, amendment No. 2000-95-5, and effective 11-29-95. Policy is excerpted below:

When any ground disturbing action or activity is proposed, determine the risk of introducing or spreading noxious weeds associated with the proposed action.

> *1. For projects having moderate to high risk of introducing or spreading noxious weeds, the project decision document must identify noxious weed control measures that must be undertaken during project implementation.*
>
> *2. Use contract and permit clauses to prevent the introduction or spread of noxious weeds by contractors and permittees. For example, where determined to be appropriate, use clauses requiring operators or permittees to clean their equipment prior to entering national Forest system lands.*

District Rangers are responsible for:

> *1. Determining the risk of noxious weed introduction or spread as part of the NEPA process for proposed actions, especially for ground disturbing and site altering activities.*
>
> *2. Enforcing closure or prohibition orders issued under 36 CFR Parts 261.50(a) and 261.58(t) and enforcing contract specifications intended to prevent and control the spread of noxious weeds.*
>
> *3. Ensuring that contracts and permits contain appropriate clauses concerning the prevention of spread of noxious weeds.*

2081.2 - Prevention and Control Measures. Determine the factors, which favor the establishment and spread of noxious weeds and design management practices or prescriptions to reduce the risk of infestation or spread of noxious weeds.

Where funds and other resources do not permit undertaking all desired measures, address and schedule noxious weed prevention and control in the following order:

First Priority: Prevent the introduction of new invaders,

Second Priority: Conduct early treatment of new infestations, and

Third Priority: Contain and control established infestations.

The design criteria (Table 3- Resource Protection Measures by Unit and Alternative) for the Salt Timber Harvest and Fuel Reduction Project were developed to reduce the risk of importation and movement of non-native invasive plant species across the project area.

Weed Definitions and Regulations

Noxious weed is a legal term applied to plants regulated by federal and state laws. The Noxious Weed Coordination and Plant Protection Act 2000 (Public Law 106-224) defines a noxious weed as follows:

"NOXIOUS WEED - The term 'noxious weed' means a plant or plant product that has the potential to directly or indirectly injure or cause damage to a plant or plant product through injury or damage to a crop (including nursery stock or a plant product), livestock, poultry, or other interest of agriculture (including irrigation), navigation, natural resources of the United States, public health, or the environment."

The National Invasive Species Council defines "invasive species" as a species that is: (1) nonnative (or alien) to the ecosystem under consideration; and (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Other laws, regulations, and policies related to noxious weed management that are addressed by this project include, but are not limited to:

Executive Order 13112 of 1999 states Federal Agency duties are as follows:

- Identify actions that may affect the status of invasive species.
- Use relevant programs and authorities to: (a) prevent the introduction of invasive species; (b) detect and respond rapidly to and control populations in a cost-effective and environmentally sound manner; (c) monitor; (d) restore; (e) research; and (f) promote public education on invasive species.
- Not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species.
- Coordinate these duties with the National Invasive Species Council that coordinates Federal strategies to address the problem of noxious weeds.

Plant Protection Act of 2000, Public Law 106-224, and the 1990 Farm Bill, Public Law 101-624, which directed the Forest Service to develop and coordinate management programs for controlling undesirable plants.

USDA Policy 9500-10 directs the Agency to integrate noxious weed management into all programs and activities and to develop, demonstrate, and apply the essential science, technology, and stewardship to effectively manage and prevent the spread of these plants.

National Prevention Strategy for Invasive Plant Management

Forest Service "Pulling Together Initiative" for noxious weed and nonnative invasive plant management that directed the Agency to set goals of education, implement integrated weed management as a high priority, include management of noxious weeds in all planning processes, and develop partnerships.

Forest Service Manuals 2080 and 2150 and Regional Supplement No. 2100-98-1 establish policy and implement programs for noxious weed management.

Existing Condition

Information on weed presence and abundance was documented with field surveys for sensitive plants. There is one high priority weed species within the proposed project area, Canada thistle (*Cirsium arvense*). Annual grasses were the dominant weed species present in the project area, particularly in areas of past heavy disturbance such as old fuelbreaks and roadsides. Isolated populations or individuals of yellow starthistle on roadsides and bull thistle within treatment units were found but only in low to moderate amounts. Annual grasses occupy a large portion of wildland and agricultural California, so exportation of these weeds to uninfested areas by service vehicles is of low concern.

A high priority weed species is one that is of important local management concern because of its currently limited distribution on the Shasta-Trinity National Forest, highly invasive nature, and demonstrated potential to displace large geographic areas of native plant communities. Inadequate funding does not allow treatment of all non-native species, so emphasis is given primarily to high priority weed species. High priority weed species for the west side of the Shasta-Trinity National Forest are species that have a documented presence on the Forest and include any knapweed species (*Centaurea* other than *C. solstitialis*), dyers woad (*Isatis tinctorius*), brooms (*Cytisus* spp., *Genista* spp., *Spartium* spp.), Canada thistle (*Cirsium arvense*), and fennel (*Foeniculum vulgare*)

Two populations of Canada thistle are found within the planning area. One population is located along FS Road U29N55B and another population is located along along FS Road U36TRI03. Both populations are less than 0.25 acres in size. The U29N55B population is moderately dense and the U36TRI03 population has a very low density. Treatment options for Canada thistle do not include manual removal because the species is stimulated by pulling. In the absence of herbicides as a tool to treat Canada thistle, prevention by eliminating disturbance to populations is the most effective way to avoid increasing numbers. To avoid disturbance, Road U29N55B was eliminated from consideration as a haul route and would be decommissioned with Alternative 2 and 3 of this project. U36TRI03 is planned for decommissioning through the Forests' West Side Watershed Restoration Project, and the population is not right on the road and there is a barrier of dry, upland soils between the population and the road, leaving a large space to avoid disturbance to the thistle population during decommissioning. Both occurrences of Canada thistle would be avoided during mechanical road decommissioning to prevent disturbance to the roots.

Herbicides would not be used to treat any noxious weeds in the Salt Project Area.

Impacts of No Implementation

Implementation of the No Action alternative would result in no increase in suitable habitat for noxious weeds from project related activities. Suitable habitat for weeds decreases with full canopy closure. Lack of disturbance and maintenance of the canopy would continue to discourage the establishment of weeds, allowing native species to occupy the majority of habitat in the project area. Other factors that contribute to introduction and establishment of weeds, such as off-road vehicle use, transport on vehicles traveling through the Salt Project Area, spread of existing roadside noxious weeds, and potential wildfires would continue.

Impacts of Alternatives 2 and 3

Because both populations of Canada thistle will be protected from direct disturbance, the action alternatives would not contribute to spread of noxious weeds. There is a slight difference between Alternatives 2 and 3 in terms of impacts on or from known noxious weeds with more

acreage being proposed for treatment in Alternative 2 it has a slightly higher risk from weeds than Alternative 3 (Table 2/Appendix C).

Noxious weed habitat is created when soil is disturbed by removing competing vegetation, exposing bare soil, and accelerating water loss. Noxious weeds have developed strategies that allow them to out-compete native species by germinating and occupying land faster than native species and under environmental conditions that are not as well tolerated by native species. Major components of the proposed action, including mastication, helicopter and cable yarding, and biomass chipping, would result in very little soil disturbance or creation of suitable habitat for noxious weeds. These activities take place on or above the soil surface and are not very invasive into the soil. Mastication treatments would grind up vegetation and leave it on the ground, creating a layer of mulch that may actually work to prevent introduction of noxious weeds. Yarding with tractors may provide some light soil disturbance, but limited tractor passes combined with overstory canopies of 50 percent or greater will discourage introduction or establishment of weeds.

Under the action alternatives, notable soil disturbance would occur through skid trail development, road and landing construction and decommissioning, pile burning, and machine piling. This would create and increase habitat for noxious weeds, particularly annual grasses. While annual grasses are small in stature, in moderate to heavy densities they are flammable and can carry fire in habitats that historically were occupied by native perennial grasses and shrubs that may have been less likely to carry fire quickly. Annual grasses, providing a localized example of potential to occupy new sites, densely cover several historically disturbed sites throughout the project area. Creation of suitable habitat would increase the potential for chance introductions of new noxious weed species from outside areas.

Increased soil disturbance may occur in designated skid trails because tractors try to restrict their movement through units to these areas. Skid trails will provide new suitable habitat for noxious weeds after completion of project activities. Shasta-Trinity LRMP (USDA Forest Service 1995) restricts excessive compaction to no more than 20 percent of land harvested with uneven-age systems. A project specific resource protection measure, which is more protective, states: *"Dedicate no more than 15 percent of a harvest unit to primary skid trails and landings"*. Assuming 15 percent of tractor-harvested acres would be in skid trails, skid trail development could create suitable habitat for noxious weeds on 148 acres in Alternative 2 and 132 acres in Alternative 3.

Road reconstruction, temporary road construction, landing construction, and decommissioning of roads and landings by ripping would result in heavy soil disturbance twice during project implementation. Total disturbance from these activities would be approximately 14.1 miles plus 54 landings (13.8 miles of decommissioning, 17.1 miles of existing road reconstruction, and .3 miles of temporary road construction in Alternative 2), or about 39.24 total acres in Alternative 2, and 38.7 acres in Alternative 3. Initial construction and reconstruction could facilitate weed introduction by service vehicles traveling through the project area. Roads that are reducing access due to poor condition could in effect reduce some vehicular vectors and reconstruction could continue the presence of weed vectors in the long term. Decommissioning roads and landings would then create loose, bare mineral soil that is excellent habitat for noxious weeds. Habitat would be available until the disturbed site is occupied by native species.

Machine piling would result in the greatest amount of soil disturbance and creation of suitable habitat for noxious weeds. Dozer blades with teeth would dig into the surface 6-12 inches of soil, exposing bare mineral soil that is suitable for weed introduction and establishment. The ultimate

goal of this project is to improve conifer habitats, including an overstory of at least 50 percent cover (which would help to shade out weeds), but until an overstory is achieved or the soil surface is occupied by native vegetation, there would be suitable habitat for noxious weed introduction and establishment. Tractor piling with site prep or for jackpot burning would occur on 161 and 130 acres in Alternative 2 and Alternative 3 respectively within the proposed project area.

Cumulative Effects

Temporal and Spatial Bounding

The cumulative effects analysis area is spatially bounded by the following:

- Southwest to FS Road 29
- Southeast to FS Road 30
- Northwest and northeast to Highway 36

Major highways and roads are a somewhat unusual basis for bounding, but they identify the main vectors that are responsible for transporting and introducing noxious weeds into the project area. Identification of all activities that have occurred along the entire length of these highways would not contribute well to a discussion of cumulative effects, so listing of past and future activities would be restricted to the geographic area identified above. The spatial cumulative effects analysis area encompasses a geographic area of 26,400 acres.

The cumulative effects analysis is bounded in time by the amount of time required for native plant communities to become stabilized enough to once again resist invasive weed introduction and establishment; approximately 10-25 years. The date of the first introduction of noxious weeds into the Salt project area is unknown, but it is most likely the time when roads were built to harvest timber in the area. A complicating factor to identifying the future timeframe for analysis is that as more weed species displace native species and establish in an area, the potential for native plant communities to recover and dominate over noxious weeds decreases.

Past, Present, and Reasonably Foreseeable Future Activities

There have been 3,243 acres of past timber harvest within the cumulative effects analysis area that occurred after 1980 when the chance of introducing noxious weeds from outside areas was greater. Commercial thinning and clearcutting caused soil disturbance that created suitable habitat for noxious weeds, especially on gentler slopes where tractors were used for yarding and site preparation for tree planting. Limited tractor passes combined with overstory canopies of 50 percent or greater discouraged introduction or establishment of weeds outside of skid trails.

The Salt Project would use tractors to harvest timber and reduce fuels on an additional 986 and 877 acres for Alternative 2 and Alternative 3 respectively. Tractor piling with site prep or for jackpot burning would occur on 161 and 130 acres (Alternative 2 and Alternative 3 respectively within the proposed project area) within those same acres, all of which could develop suitable habitat for noxious weeds.

Non-native invasive weeds occupy a large portion of Trinity County, although high priority species such as knapweeds and dyers woad are more restricted in their distribution. Weeds are commonly found on roadsides, in urban developments, in early-seral forested habitats and in open valleys. Weed control in Trinity County has been difficult because environmental analysis for the use of herbicides for weed control on the Shasta-Trinity National Forest has not been completed and County officials have discouraged their use on other lands within the County. It is difficult to

estimate the actual number of acres occupied by weed species, but for cumulative effects analysis an estimate of 20 percent of all land within the cumulative impacts analysis, 13,200 acres will be assumed.

There are 169 miles of roads within the cumulative effects analysis area. All of the roads provide a vector for transportation and introduction of noxious weeds, although the more primary transportation routes are the most responsible. Vehicle traffic within the Salt Project area is fairly low, with most traffic resulting from fuel wood collection, seasonal hunting, and visitation to Hall City Cave. This reduces the chance of introduction of noxious weeds from areas outside Trinity County, and spread of weeds already present along roads.

Table 2./Appendix C. Summary of Actions Affecting Suitable Habitat for Noxious Weeds within the Salt Creek Watershed, Including Past, Future, and Proposed Actions

Action	Total Project Acres	Acres with Potential Negative Effect	Explanation of Effects
Past			
Past timber sales-skid trail development	3,243	649	bare soil exposure, loss of moisture from soil
Wildfire	352	352	bare soil exposure
Future			
Total Past and Future Action Impacts	3,595	1,001	
Proposed Action			
Skid Trail Development-Timber Sale Associated		Alt.2: 148 Alt 3: 132	bare soil exposure, loss of moisture from soil
Road and landing (re)construction and decommissioning		Alt.2: 39, Alt 3: 38.7	heavy disturbance in the absence of native vegetation, bare soil exposure, loss of moisture from soil
Machine Piling Including Shaded Fuelbreak Construction		Alt.2: 264, Alt 3: 130	bare soil exposure, loss of moisture from soil, lethal soil temperatures for native vegetation
Treat on Site (removal, chipping, or concentration for burning within treatment units)		Alt.2: 1,306, Alt 3: 1,168	limited base soil, but due to soils considerations and needle-cast from overstory trees short term risk
Handpiling		Alt.2: 152, Alt 3: 148	
Total Proposed Action Impacts		Alt 2: 1,619 Alt 3: 1,446	
Past, Future, Proposed Action Combined		Alt 2: 5,214 Alt 3: 5,041	

Several resource protection measures would help to reduce the potential for noxious weeds to be introduced or spread as a result of the proposed actions. Contract Provision C6.36 [Equipment Cleaning 5/01] would be incorporated into the final project contract as an additional mitigation to prevent the spread of invasive weeds. This provision requires the operator to insure his equipment is free of weed seeds or propagules prior to entering the project area. A copy of the complete text of the contract provision can be obtained at the Weaverville Ranger District or on the web at http://www.fs.fed.us/invasivespecies/documents/FS_WeedBMP_2001.pdf

Decommissioned roads and landings would be seeded with native grass seed mixed with non-persistent cereal grains as needed. Certified weed-free straw would be spread on all decommissioned roads and landings, and the most heavily disturbed skid trails.

There would be a moderate to large amount of soil disturbance from the proposed action, resulting in creation of suitable habitat for noxious weeds. Invasive weeds are well established and no populations of high-priority weeds are present within the planning area. Roadsides have long been known to contain high amounts of suitable habitat for noxious weeds because of perpetual disturbance and the high probability of weed introductions from vehicles passing through. The Proposed Action may contribute up to an additional 2.4 percent of suitable habitat for noxious weeds. With implementation of equipment cleaning, seeding, and mulching measures, weed introduction and spread from the proposed action is expected to be minor relative to current level of weeds.