

# **Appendix A – Wildlife Biological Evaluation and Assessment**



# **Wildlife Biological Assessment and Biological Evaluation for the Porcupine Vegetation and Road Management Project**

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March 13, 2008



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## Introduction

This biological assessment and biological evaluation (BA/BE) is the means to describe any expected, predicted, or measurable impacts of a federal action on federally listed and Forest Service sensitive wildlife species. The federal action in this case is the Porcupine Vegetation and Road Management Project (Project) located on the Shasta-McCloud Management Unit of the Shasta-Trinity National Forest. Land allocations include Matrix, Late-Successional Reserve (LSR), Administratively Withdrawn, and Riparian Reserve lands as set forth in the Record of Decision (ROD) for amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (NWFP)<sup>1</sup> and as incorporated into the Shasta-Trinity National Forest Land and Resource Management Plan (LRMP).<sup>2</sup> The purpose of this BA/BE is to document analysis of the potential effects or impacts of the alternatives for the Project on the following species and their habitats:

### Threatened and Endangered Species for Quads in Project area

Northern spotted owl – *Strix occidentalis caurina*

Vernal pool tadpole shrimp – *Lepidurus packardii*

#### R5 Sensitive Species for the Shasta-Trinity NF<sup>3</sup>

Northern goshawk – *Accipiter gentilis*

Bald eagle – *Haliaeetus leucocephalus*

Willow flycatcher – *Empidonax traillii*

Pallid bat – *Antrozous pallidus*

Townsend's big-eared bat – *Corynorhinus townsendii*

Western red bat – *Lasiurus blossevillii*

Pacific fisher – *Martes pennanti pacifica*

American marten – *Martes Americana*

California wolverine – *Gulo gulo luteus*

Northwestern pond turtle – *Clemmys marmorata marmorata*

Shasta salamander – *Hydromantes shastae*

Southern torrent salamander – *Rhyacotriton variegates*

Foothill yellow-legged frog – *Rana boylei*

Cascade frog – *Rana cascadae*

Shasta sideband snail – *Monadenia troglodytes troglodytes*\*

Wintu sideband snail – *Monadenia troglodytes wintu*\*

Shasta chaparral snail – *Trilobopsis roperi*\*

Tehama chaparral snail – *Trilobopsis tehamana*\*

Pressley hesperian snail – *Vespericola pressleyi*\*

Shasta hesperian snail – *Vespericola shasta*\*

California floater – *Anodonta californiensis*

Scalloped juga – *Juga (Calibasis) occata*

Nugget pebblesnail – *Fluminicola seminalis*

Montane peaclam – *Pisidium (Cyclocalyx) ultramontanum*

\* Indicated species are also classified as Survey and Manage

<sup>1</sup> U.S. Department of Agriculture Forest Service and U.S. Department of the Interior Bureau of Land Management. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. Portland, Oregon. 78 pages.

<sup>2</sup> U.S. Department of Agriculture Forest Service. 1995a. Shasta-Trinity National Forest Land and Resource Management Plan. Shasta-Trinity National Forest. Redding, California. 360 pages.

<sup>3</sup> U.S. Department of Agriculture Forest Service. 2007. R5 Sensitive Animal Species by Forest. Unpublished document on file at USDA Forest Service Pacific Southwest Region. San Francisco, California.

Summary of Effects or Impacts to Wildlife Species for the Project

The following tables summarize the species analyzed, the predicted effects or impacts, determinations, and rationale as to why further analysis was not necessary.

**Table 1. Endangered and threatened wildlife species for the Project area quads in Siskiyou County, California**

Species	Species Status	Species or Habitat Present	Management Requirements	Effects Determination
Northern spotted owl <i>Strix occidentalis caurina</i>	T	Yes	Maintain core nest area, limited operating period	NLAA
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	E	No	Not applicable, species does not exist in the project area.	No Effect

E= Federally endangered; T= Federally threatened; NLAA= Not Likely to Adversely Affect

**Table 2. Regional Forester's Sensitive species considered in this analysis**

Species	Species Status	Species or Habitat Present	Management Requirements	Impacts Det.	Rationale for No Additional Analysis
Northern goshawk <i>Accipiter gentilis</i>	S	Yes	Limited operating period, maintain primary and secondary nest areas	MIIH	
Bald eagle <i>Haliaeetus leucocephalus</i>	S	No		No impact	No habitat
Willow flycatcher <i>Empidonax traillii</i>	S	No		No impact	No habitat
Pallid bat <i>Antrozous pallidus</i>	S	Yes		MIIH	
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	S	Yes		MIIH	
Western red bat <i>Lasiurus blossevillii</i>	S	No		No impact	No habitat present
Pacific fisher <i>Martes pennanti pacifica</i>	S,C	No		No impact	
American marten <i>Martes americana</i>	S	Yes		MIIH	
California wolverine <i>Gulo gulo luteus</i>	S	No		No impact	Outside range
Northwestern pond turtle <i>Clemmys marmorata marmorata</i>	S	No		No impact	No habitat
Shasta salamander <i>Hydromantes shastae</i>	S	No		No impact	No habitat, outside species range
Southern torrent salamander	S	No		No impact	Outside range

Species	Species Status	Species or Habitat Present	Management Requirements	Impacts Det.	Rationale for No Additional Analysis
<i>Rhyacotriton variegatus</i>					
Foothill yellow-legged frog <i>Rana boylei</i>	S	No		No impact	No habitat
Cascade frog <i>Rana cascadae</i>	S	No		No impact	No habitat
Shasta sideband snail <i>Monadenia troglodytes troglodytes</i>	S, S&M	No	Survey prior to activity	No impact	No habitat
Wintu sideband snail <i>Monadenia troglodytes wintu</i>	S, S&M	No	Survey prior to activity	No impact	No habitat
Shasta chapparral snail <i>Trilobopsis roperi</i>	S, S&M	No	Survey prior to activity	No impact	No habitat
Tehama chapparral snail <i>Trilobopsis tehamana</i>	S, S&M	No	Survey prior to activity	No impact	No habitat
Pressley hesperian snail <i>Vespericola pressleyi</i>	S, S&M	No	Survey prior to activity	No impact	No habitat
Shasta hesperian snail <i>Vespericola shasta</i>	S, S&M	Yes	Survey prior to activity	MIIH	
California floater <i>Anodonta californiensis</i>	S	No		No impact	No habitat
Nugget pebblesnail <i>Fluminicola seminalis</i>	S	No		No impact	No habitat
Scalloped juga <i>Juga (Calibasis) occata</i>	S	No		No impact	No habitat
Montane peaclam <i>Pisidium (Cyclocalyx) ultramontanum</i>	S	No		No impact	No habitat

S = R5 Sensitive species; S&M = Survey and manage species; MIIH = may impact individuals or habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Only species found in the project area or that have habitat in the project area will be further discussed in this analysis. All other species will no longer be considered.

### Current Management Direction

The desired future condition for the Porcupine Butte and McCloud Flats Management Areas on the northeastern edge of the Shasta-McCloud Management Unit that includes the proposed Porcupine Vegetation and Road Management Project is described in the Shasta-Trinity Final Forest Land and Resource Management Plan,<sup>4</sup> and identifies this area as having Matrix (47,509 acres), Late-Successional Reserve (LSR) (830 acres), Administratively Withdrawn (2006 acres), and Riparian Reserve allocations (320 acres).

The Shasta-Trinity National Forest LRMP is generally more restrictive to projects and more beneficial to wildlife than the NWFP. The Shasta-Trinity National Forest LRMP incorporated

<sup>4</sup> U.S. Department of Agriculture Forest Service. 1995b. Shasta-Trinity National Forest Land and Resource Management Plan Environmental Impact Statement. Shasta-Trinity National Forest. Redding, California. 725 pages.

the NWFP into its framework when it was created in 1995 and therefore, the more restrictive LRMP guidelines would be implemented in the Porcupine Vegetation and Road Management Project.

### Federal Endangered and Threatened Wildlife

Section 7 of the Endangered Species Act of 1973, as amended, directs Federal departments and agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened, endangered or proposed species or result in the destruction or adverse modification of their critical habitats. The act mandates consultation with the appropriate Secretary whenever an action is likely to jeopardize the continued existence of any species proposed for listing as threatened or endangered, or whenever an action might result in destruction or adverse modification of critical habitat proposed for listing (50 CFR 402).

### Standards and Guidelines – Forestwide

These S&Gs are applicable across all management allocations, as they relate to wildlife for the Project:

- Survey and manage species – manage known sites, conduct surveys prior to ground-disturbing activities, and conduct extensive surveys (LRMP 4-12 through 4-13).
- Natural openings – management will be determined at the project level consistent with desired future conditions (LRMP 4-14).
- Snags – over time, provide the necessary number of replacement snags to meet density requirements as prescribed for each ROD allocation and/or management prescription. Live, green culls and trees exhibiting decadence and/or active wildlife use are preferred (LRMP 4-14).
- Dead/down material – maintain unburned dead/down material in the quantity prescribed for each land allocation and/or management prescription (LRMP 4-14).
- Corridors – provide connecting travel corridors for wildlife species, particularly late-successional species, by using Riparian Reserves and silvicultural prescriptions (LRMP 4-14).
- Threatened, Endangered, and Sensitive (TES) Wildlife – Maintain or enhance habitat for TES species consistent with individual species recovery plans; Survey and evaluate habitat for TES species at the project level in coordination with the USFWS; place in Prescription VII or IX, and/or require limited operating periods (LOPs) or other restrictions as appropriate; Require LOPs adjacent to active goshawk nesting sites until young have fledged, February 1 – August 15 (LRMP 4-30 and LRMP Appendix G).

### Standards and Guidelines – Matrix

Matrix S&Gs applicable to this project and the resident wildlife species include the following (LRMP 4-61 through 4-64):

- Provide specified amounts of coarse woody debris.
- Emphasize green-tree and snag retention.
- Provide additional protection for caves, mines, and abandoned wooden bridges and buildings that are used as roost sites for bats.
- Modify site treatment practices, particularly the use of fire and pesticides, and modify harvest methods to minimize soil and litter disturbance.

- Provide for retention of old-growth fragments in watersheds where little remains.
- Protect known Northern Spotted Owl Activity Centers (minimum 100 acre core) within Matrix as identified in the Record of Decision (ROD) of the Northwest Forest Plan. Manage Matrix lands near known owl activity centers in LSRs to reduce the risks associated with natural disturbance.

### Standards and Guidelines - Late-Successional Reserves and Managed Late-Successional Areas

- Silvicultural guidelines are in place to reduce the risk of large-scale disturbance (LRMP 4-37 through 4-39).
- Maintain dead/down material, hardwoods, and snags at naturally occurring levels (LRMP 4-44).
- Exclude management activities within occupied goshawk nest stands during the nesting period (LRMP 4- 44). This is achieved through implementation of a limited operating period (LOP) from 1 February – 15 August (LRMP Appendix G).

### Standards and Guidelines – Riparian Reserves

- Design and implement fish and wildlife habitat restoration and enhancement activities in a manner that contributes to attainment of Aquatic Conservation Strategy objectives (LRMP 4-58).

## Consultation to Date

Updated USFWS species lists by quad, dated January 31, 2008, were obtained on March 6, 2008, from the Sacramento Fish and Wildlife Office website for the Porcupine Vegetation and Road Management Project (quads 696A-D and 713D). This list fulfills the requirement of the Fish and Wildlife Service to provide a species list pursuant to Section 7 (c) of the Endangered Species Act, as amended.

Mr. Keith Paul of the U.S. Fish and Wildlife Service, Red Bluff office provided consultation to the planning process beginning in 2007. Mr. Paul visited the Project area in June 2007 with Ms. Debbie Derby, Wildlife Biologist for the Shasta-McCloud Management Unit.

## Methods and Resources

Much of the analysis of effects in this document is based on pre-existing data and site visits. Data sources include surveys, literature reviews, geographic information systems (GIS) data, and personal communication with other Forest Service personnel.

Northern spotted owl habitat was analyzed in the following manner: California Baseline data developed by the U.S. Fish and Wildlife Service and four northern California National Forests within the range of the northern spotted owl was utilized to set up northern spotted owl surveys. The existing northern spotted owl habitat in this California Baseline is simply identified as “foraging”, “nesting and roosting”, or “capable”. This Baseline habitat acreage was slightly modified using the Forest activities information (FACTS database), 2005 NAIP imagery, and site visits to remove obvious forest openings from timber sales, silviculture treatments, and young plantations from the list of currently suitable foraging habitat. This Modified Baseline habitat reflects what is actually on the ground. Much of the capable areas within the Project boundary are pure pine plantations and could, in theory, become suitable foraging habitat or better, but are

unlikely in this area of the District because of the dry climate, lack of water sources, and plantation management. These pine plantations along the east edge of the District and project area (Red Hill, for example) are extensive and lack other conifer species to eventually produce suitable habitat. In addition, these stands of timber in the eastern portion of the Project area are well in excess of 200 feet spaced apart from other connected habitats and were therefore removed from the capable list as well. On the west side of the Project and boundary, other existing plantations are smaller and adjacent to mixed conifer stands and therefore could be foraging habitat in the future.

Hence, the ground-validated Modified Baseline habitat data will be utilized as the best information available and used to establish the existing condition and compare/contrast the effects of the various alternatives on the northern spotted owl habitat within and adjacent to the project area.

Habitats for the remaining species were modeled using the Forest's vegetation database, updated in 2000 and adjusted as above. Stands selected as northern goshawk habitat for this exercise are trees with a crown diameter greater than 12 feet and a crown closure greater than or equal to 40 percent ("3N"). Although habitat for the northern goshawk is assumed to be managed through northern spotted owl habitat management, the greater flexibility in habitat preferences of the northern goshawk could allow this other method of analysis. Habitat for the American marten was modeled likewise, but includes older and mature pine plantations as these types may be suitable foraging habitat. Bat species' habitats were modeled using this Forest database, querying open habitat types and brush ("3P" and smaller and less dense).

## Summary

The Shasta-McCloud Management Unit of the Shasta-Trinity National Forest is proposing to conduct forest health and fuels management activities on about 4,300 acres in the Porcupine Vegetation and Road Management Project. Activities proposed include thinning, fuels reduction, aspen and meadow restoration, and road management. Byproducts of these proposed activities include sawtimber and biomass material.

The purpose and need for this proposal stems from a difference between the desired future conditions in the Project area and the existing conditions. Proposed activities could move that area toward desired forest conditions. Identified needs include: improve forest health and growth, reduce fuels, and maintain aspen and meadows. See the LRMP for further discussion on desired future conditions of the Shasta-Trinity National Forest.

For a detailed description of the Project area, purpose and need, and proposed activities, see the Environmental Assessment.

## Proposed Action and Alternatives

See Figure 1 below for a map of the Proposed Action and Alternatives. The Proposed Action (Alternative 1) is shown with its proposed stand treatments. Alternative 2 would treat the same stands as the Proposed Action with the following exception: those stands or portions of stands occurring in the black outlined area on the north end of the Project would not be entered. Alternative 3 would treat the same areas as the Proposed Action with two additional units, shown in solid black. Alternative 4 (No Action) would not propose any activities and is therefore not specifically displayed.

**Proposed Action- Alternative 1**

The Proposed Action would reduce stand densities and fuels on approximately 4,270 acres. In addition, 30 acres of meadow and 30 acres of aspen would be restored. Road management actions include 103 miles of haul road maintenance and decommissioning of 2 miles of road that impact meadows. The following tables summarize the treatments and road management activities.

**Table 3. Summary of Proposed Action Treatments**

Forest Stand Treatments	Forest Stand Treatment Acres	Fuel Treatment Acres			
		Slashing	Hand Pile & Burn	Machine Pile & Burn	Underburn
Standard Thin	3,370 (Matrix)	260	110	30	1,590
Biomass Thin	350 (Matrix)	0	0	0	0
	100 (LSR)	0	20	0	0
Hazard Reduction	140 (Matrix)	140	0	1890	0
	120 (LSR)	70	0	120	0
Mature Stand Thin	140 (Matrix)	140	0	130	20
	10 (LSR)	10	0	10	0
Lodgepole Regeneration with Green Tree Retention	40 (Matrix)	0	0	40	0
Aspen Release	30 (Matrix)	30	0	0	30
Meadow Restoration	30 (Matrix)	30	0	0	20
<b>Total Acres</b>	<b>4,330</b>	<b>680</b>	<b>130</b>	<b>420</b>	<b>1,660</b>

**Table 4. Summary of proposed action road management**

Road Management Actions	Miles
Roads Decommissioned	2
Haul Maintenance	103

**Proposed Action Definitions/Explanations – Forest Health and Growth**

The following are the treatments that would be applied to the stands in order to meet stand objectives. Table 3 above indicates which treatments occur in Matrix and LSR allocations.

**Standard Thin**

Overstocked forest stands, stands where stocking density exceeds management objectives, would be thinned by removing primarily understory and mid-story trees to achieve desired stocking. Some dominant and co-dominant trees may be removed to attain desired stocking. Excess trees would be removed as sawlogs (trees 10 inches and greater in diameter) and biomass material (4 to 9.9 inch diameter trees). Thinning treatments vary, depending on the management prescription and objective. Treatment objectives include: improve stand health and tree growth, improve resistance to insect mortality, remove ladder fuels, shift species composition, and improve the growth of shrub and forage species.

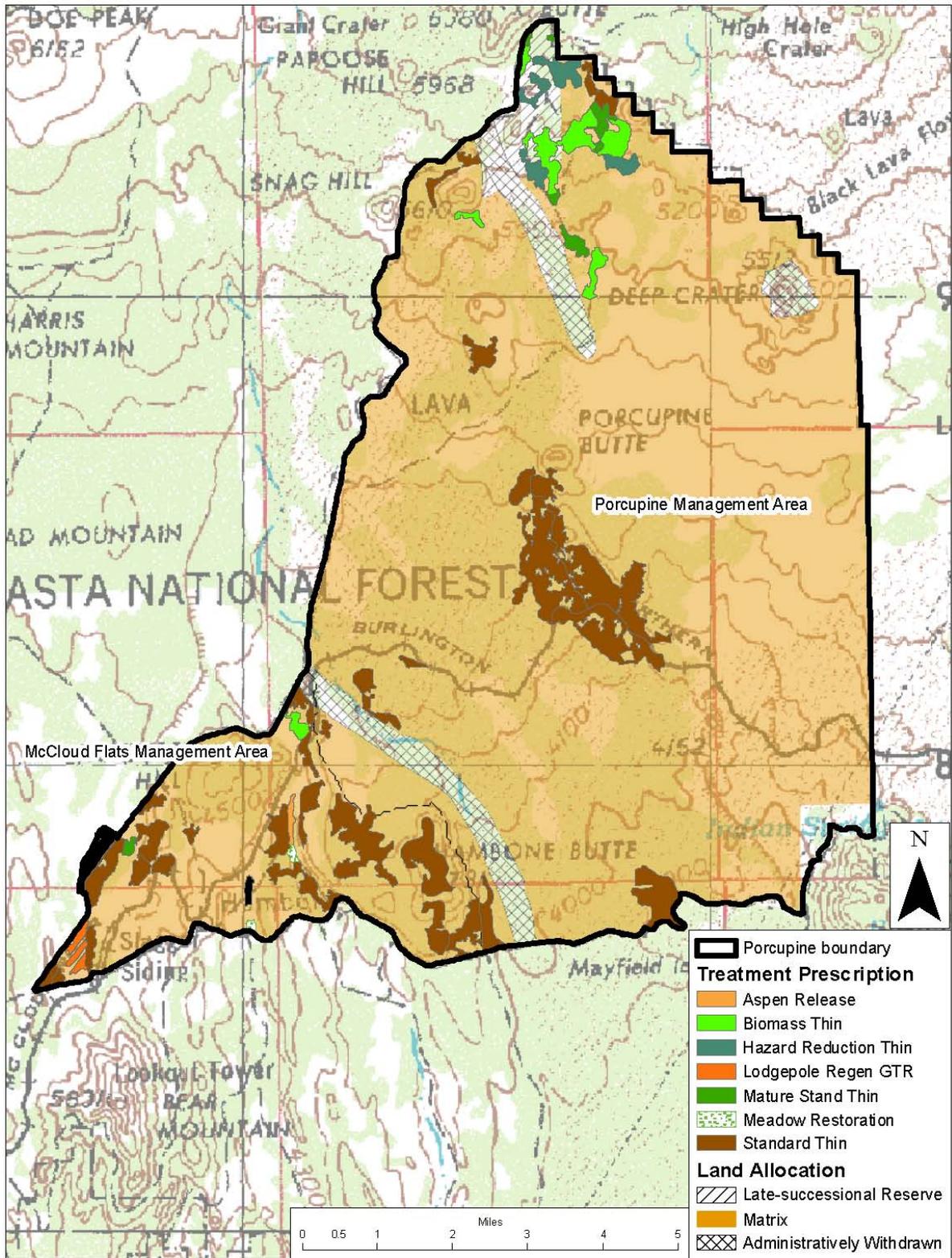


Figure 1. Proposed treatments for all action alternatives

### *Biomass Thin*

Overstocked forest stands would be thinned from below by removing primarily understory trees to achieve desired stocking. Most trees to be removed would range from 4 to 13 inches in diameter and the harvest would yield primarily biomass material. Occasional co-dominant trees larger than 13 inches would be removed to achieve treatment objectives; this would be the exception. The rationale for removing occasional co-dominant trees is to allow for access in the stands. Treatment objectives include: improve stand health and tree growth, improve resistance to insect mortality, and remove ladder fuels.

### *Hazard Reduction*

Stands would be thinned by removing trees 4 to 13 inches in diameter. The objective is to remove ladder fuels in stands with late-successional characteristics and reduce the likelihood of stand replacing disturbances such as crown fire or high levels of insect caused mortality that would result in the loss of key late-successional structure.

### *Mature Stand Thin*

Stands would be thinned by primarily removing trees 4 to 13 inches in diameter. The objective is to remove ladder fuels in stands with late-successional characteristics and reduce the likelihood of stand replacing disturbances such as crown fire or high levels of insect caused mortality that would result in the loss of key late-successional structure.

### *Lodgepole Regeneration with Green Tree Retention*

Overmature lodgepole pine would be regenerated by harvesting most trees 4 inches in diameter and greater. Overmature trees are those that have reached a stage of development where they are declining in vigor and health, and reaching the end of their natural lifespan. At least 15 percent of the stand would be retained uncut to meet the Forest Plan standard for green tree retention. Natural regeneration following harvest is expected to result in a fully stocked stand of seedlings within 5 years of the harvest. The treatment objectives are to remove diseased overstory lodgepole pine in close proximity to existing, young lodgepole and regenerate a stand of lodgepole.

### *Reduce Fuels*

Forest fuels would be reduced within harvest units by decreased understory and mid-story stocking. Commercial and biomass timber harvest would utilize whole-tree yarding; the entire tree would be removed, processed at a landing and made into logs or wood chips. Minor amounts of slash would remain in the forest as a result of harvest activities. Portions of trees not utilized as logs or chips would be piled and burned at the landing. The following fuel treatments would be in addition to whole-tree yarding. These treatments would contribute to Forest Plan goals for fire and fuels.

### **Slashing**

Conifer trees less than 4 inches in diameter would be cut, lopped, and scattered. The treatment objective is to complete the thin from below prescription and reduce ladder fuels. Slashing in the aspen stand would complete the removal of conifers.

**Hand Pile and Burn**

Harvest generated fuels would be manually piled. Piles would be burned when there is low fire danger. This treatment would reduce concentrations of activity fuels and predicted fire behavior would be within desired intensities.

**Machine Pile and Burn**

Harvest generated fuels, natural fuels, brush and heavy accumulations of litter would be piled with a tractor mounted brush rake. Piles would be burned when there is low fire danger. This treatment would also reduce concentrations of activity fuels and predicted fire behavior would be within desired intensities.

**Underburn**

Natural and harvest generated fuels would be broadcast burned in-place with a low intensity surface fire. This treatment would be applied to forest stands with low fuel loading that have a developing understory of conifer saplings. The low intensity burn would reduce surface fuels along with developing ladder fuels of conifer saplings. Underburning would require control lines, where forest litter is cleared down to mineral soil. Control lines would be constructed by hand crews, small crawler tractors, or existing roads would serve as control lines. Burning with a low intensity surface fire would reduce natural and activity fuels and predicted fire behavior would be within desired intensities.

*Maintain Aspen and Meadow*

**Aspen Release**

One aspen stand would be treated by removing conifers followed by underburning. Conifer trees within approximately 150 feet of aspen would be harvested as sawlogs and biomass. The treatment objective is to restore aspen as the predominate species within the stand. The aspen stand is currently in decline and removal of the pine followed by burning would provide good growing conditions for aspen root sprouts.

**Meadow Restoration**

Two meadows would be restored by the removal of encroaching conifers. Conifers of commercial size would be removed through harvest operations. Trees less than 4 inches in diameter would be cut and slashed. Existing roads would be blocked to normal vehicular traffic by barricading with rocks or through the construction of earth berms. Soil compaction within the road prism would be reduced by subsoiling. Vegetation on the road surface would be reestablished by seeding with native species.

***Alternative 2 – No Treatments in the Porcupine LSR***

This alternative is responsive to the issue regarding the Porcupine LSR by foregoing all treatments within LSR boundaries. Outside the LSR boundary units and treatments would be the same as Alternative 1. This alternative is also responsive to the issue regarding road management actions identified in the project level Roads Analysis Process (RAP). Road management actions identified in the project level RAP include: 2 miles of road would be surfaced with rock; 7 miles of roads open to vehicle travel would be closed with barriers and vegetation would be re-established; 3 miles of unneeded system roads would be decommissioned; and 3 miles of unclassified roads needed for long term management would be added to the system. The

following tables summarize the vegetation treatments and road management actions being proposed under Alternative 2.

**Table 5. Summary of Alternative 2 stand and fuel treatments**

Forest Stand Treatments	Forest Stand Treatment Acres	Fuel Treatment Acres			
		Slashing	Hand Pile & Burn	Machine Pile & Burn	Underburn
Standard Thin	3,300	260	110	30	1,560
Biomass Thin	350	0	10	0	0
Hazard Reduction	140	140	0	140	0
Mature Stand Thin	140	140	0	120	20
Lodgepole Regeneration with Green Tree Retention	37	0	0	40	0
Aspen Release	30	30	0	0	30
Meadow Restoration	30	30	0	0	20
<b>Total Acres</b>	<b>4,030</b>	<b>600</b>	<b>120</b>	<b>330</b>	<b>1,630</b>

All treatments would occur in the Matrix allocation

**Table 6. Summary of Alternative 2 road management actions**

Road Management Actions	Miles
Roads Decommissioned	3
Additions to System (unclassified to become system)	3
Road Reconstruction	2
Road Closure	7
Haul Maintenance	104

### *Alternative 3 -Regenerate Mature and Overmature Stands*

This alternative is responsive to the issues regarding the regeneration of over-mature stands within areas of commercial wood products emphasis, and project level RAP recommendations. This alternative also includes stands where additional opportunities to meet the project purpose and need were identified. One additional stand, about 20 acres, within areas of commercial wood products emphasis would be treated with a regeneration harvest. The additional opportunities include one additional stand, about 80 acres, to be treated with a standard thin, and one additional meadow, about 20 acres, would be restored. Road management actions are the same as those identified in Alternative 2: 2 miles of road would be surfaced with rock; 7 miles of roads open to vehicle travel would be closed with barriers and vegetation would be re-established; 3 miles of unneeded system roads would be decommissioned; and 3 miles of unclassified roads needed for long term management would be added to the system. The following tables summarize the vegetation treatments and road management actions:

**Table 7. Summary of Alternative 3 stand and fuel treatments**

Forest Stand Treatments	Forest Stand Treatment Acres	Fuel Treatment Acres			
		Slashing	Hand Pile & Burn	Machine Pile & Burn	Underburn
Standard Thin	3,380 (Matrix)	260	110	30	1,640
Biomass Thin	350 (Matrix)	0	0	0	0
	100 (LSR)	0	20	0	0
Hazard Reduction	140 (Matrix)	140	0	140	0
	120 (LSR)	70	10	70	0
Mature Stand Thin	120 (Matrix)	120	0	120	20
	10 (LSR)	10	0	10	0
Lodgepole Regeneration with Green Tree Retention	40 (Matrix)	0	0	40	0
Ponderosa Pine Regeneration Harvest with Green Tree Retention	20 (Matrix)	20	0	0	20
Aspen Release	30 (Matrix)	30	0	0	30
Meadow Restoration	50 (Matrix)	50	30	0	20
<b>Total Acres</b>	<b>4,360</b>	<b>700</b>	<b>170</b>	<b>410</b>	<b>1,730</b>

**Table 8. Summary of Alternative 3 road management actions**

Road Management Actions	Miles
Roads Decommissioned	3
Additions to System (unclassified to become system)	3
Road Reconstruction	2
Road Closure	7
Haul Maintenance	104

**Alternative 4 – No Action**

No new proposed management activities of any kind would be implemented under the no action alternative. This alternative is the baseline used to compare the environmental effects of the action alternatives.

**Past, Present, and Reasonably Foreseeable Events**

Since the late 1800s, the greater McCloud Flats have been subject to extensive vegetation changes. Roads, water developments, timber sales and other vegetation management, and fires have changed the landscape to varying degrees. Not all activities have been recorded and mapped, but timber activities since the 1950s and major fires since 1910 are available and have been utilized for discussions of cumulative effects/impacts.

## Vegetation Management within the Project Area

Not all timber sales have been recorded and mapped in the Project area. However, since the 1950s, records indicate there have been twenty named timber sales or vegetation management activities in and adjacent to the Project boundary. Activities include salvage, thinning, clearcutting, site preparation and planting, burning of fuels, and plantation releases. About 12,000 acres of the 50,000-acre project area have had entries where the vegetation was manipulated.

Historical entries were overstory removal of the largest trees. Remaining portions of the stands were logged later when the residual trees were large. Many historically occurring brush fields were converted to plantations and exist today. On some stands, particularly those on the high hills and buttes, the fir and cedar understory has replaced the pine-dominated overstory that was removed. Added to this has been fire exclusion, which has further type-converted some stands from pine-dominated to fir-dominated overstory.

Timber sales and vegetation projects can have a long-term impact on wildlife habitat. Impacts can range from modest reductions in tree density, canopy closure, and understory density common to thinning projects to losses of some types of habitat for some species where stands were clearcut and replanted. Conversely, plantations and extensive thinning could create habitat for wildlife that benefit from early-seral stage vegetation.

Recent thinning projects cover about 1,800 acres in the project area and could retain the dominant species and structure in the stands. Since the adoption of the current LRMP, thinning in mixed-conifer stands, in particular those within the range of the northern spotted owl and with potential habitat characteristics, has been managed to retain at least the minimum canopy closure requirements (forty percent) in order to retain function as habitat for the northern spotted owl and other late-successional species. While this does maintain some elevated risk for insect, disease, and fire events, those risks could be lower than that found in stands with higher stem and canopy densities.

Regeneration cuts, overstory removal, sanitation cuts, site preparations, and planting describe most of the other nearly 10,000 acres of recorded vegetation management activities within the Project boundary. Some of these areas were type conversions from other timber types or brush field conversion, often to ponderosa pine.

No other projects are scheduled within the project boundary in the next five year planning period.

## Fire and Fuel Breaks

Fire history for the area is reported in the Porcupine Watershed Assessment.<sup>5</sup> Three major fires have occurred in the Project area: 1917, which encompasses almost the entire Project boundary and burned about 65,000 acres; 1950 and 1959, which burned the eastern edge of the Project area, about 3800 and 10,900 acres, respectively. The latter two fires were responsible for creating the large brushfields that persist today.<sup>6</sup>

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<sup>5</sup> U.S. Department of Agriculture Forest Service. 2003. Porcupine Watershed Assessment. Unpublished report on file at the Shasta-Trinity National Forest. Redding, California. 169 pages.

<sup>6</sup> Ibid.

There are about 920 acres of fuel breaks in the Project area almost exclusively in the east side of the project area. An electrical transmission line also crosses the project for about 7.25 miles, and this right-of-way is maintained as a fuel break.

### Roads

According to the transportation report, there are about 2.50 miles/mile<sup>2</sup> of system roads in the Project area, and this drops to about 2.4 miles/miles<sup>2</sup> when considering open roads only. These roads are not equally distributed, and, for the most part, are located in and near timber. The large, extensive lava flows are underlain by lava flow tubes and are not conducive to road construction, thus there are extensive areas without roads, too.

According to the Porcupine Watershed Assessment,<sup>7</sup> this watershed, in general, receives little recreational use. The greatest use is from spring through autumn, and includes recreationists, firewood cutters, mushroom pickers, and hunters. There is some snowmobile activity in the winter, as well.

## Species Assessments

### *Northern Spotted Owl*

#### Species Account

The northern spotted owl (*Strix occidentalis caurina*) is listed as a threatened species by the U.S. Fish and Wildlife Service. Northern spotted owl habitat preference was identified within the Federal Register. Critical habitat was proposed within the Federal Register on May 6, 1991 (56 FR 20816-21016) and a Final Rule was published (USDI 1992) on January 15, 1992 (57 FR 1796-1838). The Federal Register Final Rule designated portions of the Shasta-McCloud McCloud Management Unit in the Shasta/McCloud Area of Concern for the northern spotted owl.

The northern spotted owl is associated with late-successional forest conditions consisting of relatively dense canopies, large-diameter live and dead standing trees, multi-storied crowns, and large-diameter downed woody debris.<sup>8</sup> Minimum foraging canopy closure is 40 percent and tree diameters range from 13-24.9 inches; nesting and roosting canopy closure is 70 percent and tree diameters range from 25-39.9 inches.<sup>9</sup> Suitable nesting, roosting, and foraging stands in this region are true fir or mixed-conifer types. Nest stand and home range size are dependent upon suitability, distribution, and amount of available habitat. For local owl populations, surface water is found in the nest stand.<sup>10</sup> Small mammals make up most of the diet. Stands maintaining a minimum canopy closure of 40 percent provide connectivity between patches of better habitat.

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<sup>7</sup> USDA Forest Service. 2003.

<sup>8</sup> U.S. Department of the Interior Fish and Wildlife Service. 1990. Federal Register. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Northern Spotted Owl. USDI Fish and Wildlife Service. Portland, Oregon. Vol. 55, No. 123.

<sup>9</sup> U.S. Department of Agriculture Forest Service. 1999. Shasta-Trinity National Forest Forest-Wide Late-Successional Reserve Assessment. Unpublished report on file at Shasta-Trinity National Forest. Redding, California. 196 pages.

<sup>10</sup> USDA Forest Service 2003.

Owls reportedly rarely cross openings greater than 200 feet when responding to calling surveys.<sup>11</sup>

West Nile virus and barred owls have become threats to northern spotted owls. West Nile virus may infect and kill birds although the impact to northern spotted owls is uncertain today.<sup>12</sup> Barred owls may pose a greater threat to northern spotted owls than previously thought.<sup>13</sup> Habitat interactions are not well known; however, barred owls are now thought to use late-successional forest, not solely younger forests.<sup>14</sup> In addition, barred owls may have a broader base to their diet, may reduce northern spotted owl survey detectability, and may occupy former northern spotted owl sites and thus displace historic northern spotted owl activity centers.<sup>15</sup>

Habitat in the dry provinces that include northern spotted owl habitat, including this Project, are believed to have developed in the last 100 years as a result of timber harvest and subsequent fire suppression.<sup>16</sup> The general consensus among biologists, silviculturists, fuel specialists and land managers attending a dry forest ecosystem workshop is that this habitat must be managed in order to protect it from large-scale losses due to extraordinary insect, disease, and fire events.<sup>17</sup>

### Existing condition

The project area is on the far eastern edge of the northern spotted owl range and outside of the designated critical habitat area. It is dry, sparsely vegetated in places, has extensive lava flows, and, therefore, forested stands are naturally fragmented. Natural water sources are uncommon in the project area and consist of several intermittent, ephemeral and vernal riparian areas, caves, springs, and water improvements (small guzzlers, cisterns).<sup>18</sup> Forest stands were historically pine-dominated with fir or mixed-conifer stands at higher elevations and shaded slopes. Current forest conditions would drive infrequent, but moderate to high-intensity wildfires. Owl habitat in this area was probably foraging habitat only as forest conditions may have been suitable for breeding in occasional years, depending mostly on water conditions.<sup>19</sup> Overall, poor soil quality, dry climate, natural fragmentation, and low productivity make this area poor northern spotted owl habitat.<sup>20</sup>

The Modified Baseline habitat layer indicates there are about 891 acres of current foraging habitat, 13.5 acres of nesting and roosting habitat within the project area, and an additional 1,232

<sup>11</sup> U.S. Department of Agriculture Forest Service. 2003. Biological Assessment for the Powder Vegetation Management Project. Unpublished report on file at Shasta-Trinity National Forest. Redding, California. 14 pages; U.S. Department of Agriculture Forest Service. 2005. Biological Assessment for the Pilgrim Vegetation Management Project. Unpublished report on file at Shasta-Trinity National Forest. Redding, California. 31 pages.

<sup>12</sup> U.S. Department of the Interior Fish and Wildlife Service. 2007. 2007 Draft Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*): Merged options 1 and 2. USDI Fish and Wildlife Service. Portland, Oregon. 173 pages.

<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

<sup>15</sup> Ibid.

<sup>16</sup> Ibid.

<sup>17</sup> U.S. Department of the Interior Fish and Wildlife Service. 2006. Silvicultural Practices Supporting Northern Spotted Owl Habitat in Dry Forest Ecosystems: Workshop Report. Roseburg, Oregon. USDI Fish and Wildlife Service. December 4 2007.

<http://www.fws.gov/oregonfwo/FieldOffices/Bend/ForestWorkshop/NSOWorkshop-06.htm>.

<sup>18</sup> USDA Forest Service. 2003.

<sup>19</sup> Wolcott, K., Forest Wildlife Biologist, Shasta-Trinity National Forest. 2007. Personal communication.

<sup>20</sup> USDA Forest Service 2003.

acres of capable habitat. The best habitat within the project area is found on hills in the otherwise open or shrub-dominated lava flows. Table 9 compares the difference between the California Baseline habitat layer and the Modified Baseline Data as discussed in the Methods and Resource section above. Figure 2 displays the location of California Baseline habitat within the project area; Figure 3 displays the location of the Modified Baseline habitat, which will be used for this analysis.

**Table 9. Northern spotted owl habitat acres in the project boundary**

<b>Data Source</b>	<b>Nesting/Roosting Acres</b>	<b>Foraging Acres</b>	<b>Capable Acres</b>
California Baseline, 1993	13.5	1,074	3,249
Modified Baseline Data - minus unsuited habitat from FACTS, NAIP interpretation, and ground validation	13.5	891	1,232

Capable habitat is vegetation that could achieve suitable foraging or nesting/roosting status if given enough time.

All suitable northern spotted owl habitat within and adjacent to the project area was surveyed under the two-year survey protocol, except for a few calling stations near the southwest corner of the Project area near Bear Mountain, which will be completed in spring 2008. On one occasion, a northern spotted owl responded from within the Project area, about 175 meters within the northwest tip of the Project boundary. All other owl responses occurred outside the boundary. In 2007 a non-breeding pair of northern spotted owls were found utilizing habitat around the Six Shooter Butte area, which is about ½ mile from the project boundary. It is likely that portions of the project area are utilized for foraging by this pair of owls, but they have only once been observed or detected within ¼ mile of the project area.

A home range was developed for the owl pair captured in 2007. First, the capture location was selected as the roost location for developing the nest core and home ranges. Second, a next core circle with a 0.7-mile radius was centered on that capture site. Third, a home range circle with a 1.3-mile radius was centered on that capture site. Nesting/roosting, foraging, and capable habitat was calculated for those portions of the nest core and home ranges occurring on the Shasta-Trinity National Forest. Because no such habitat classifications were available for the Modoc National Forest portions of the nest core and home range, foraging habitat was modeled using CalVeg GIS data, recent aerial photographs, and on-the-ground visits.

It is important to recognize that there is not currently or potentially sufficient suited northern spotted owl habitat within the project area to provide for a complete home range. There are about 891 acres of current foraging habitat, and the distribution of these units is fragmented (see Figure 3). No nest core area would have more than 500 acres of foraging habitat at time. The three most contiguous blocks of vegetation all have about 150 acres or less of existing foraging habitat. There is one 13.5-acre nesting/roosting stand within the project boundary, it is adjacent to one 50 acre foraging stand, and separated from other foraging stands by at least 900 feet of currently suitable habitat. At best, only portions of the project area would be included within a home range that existed primarily outside of the project area. This likely explains why the only one northern spotted owl response occurred within the Project area, and the rest occurred outside the Project area.

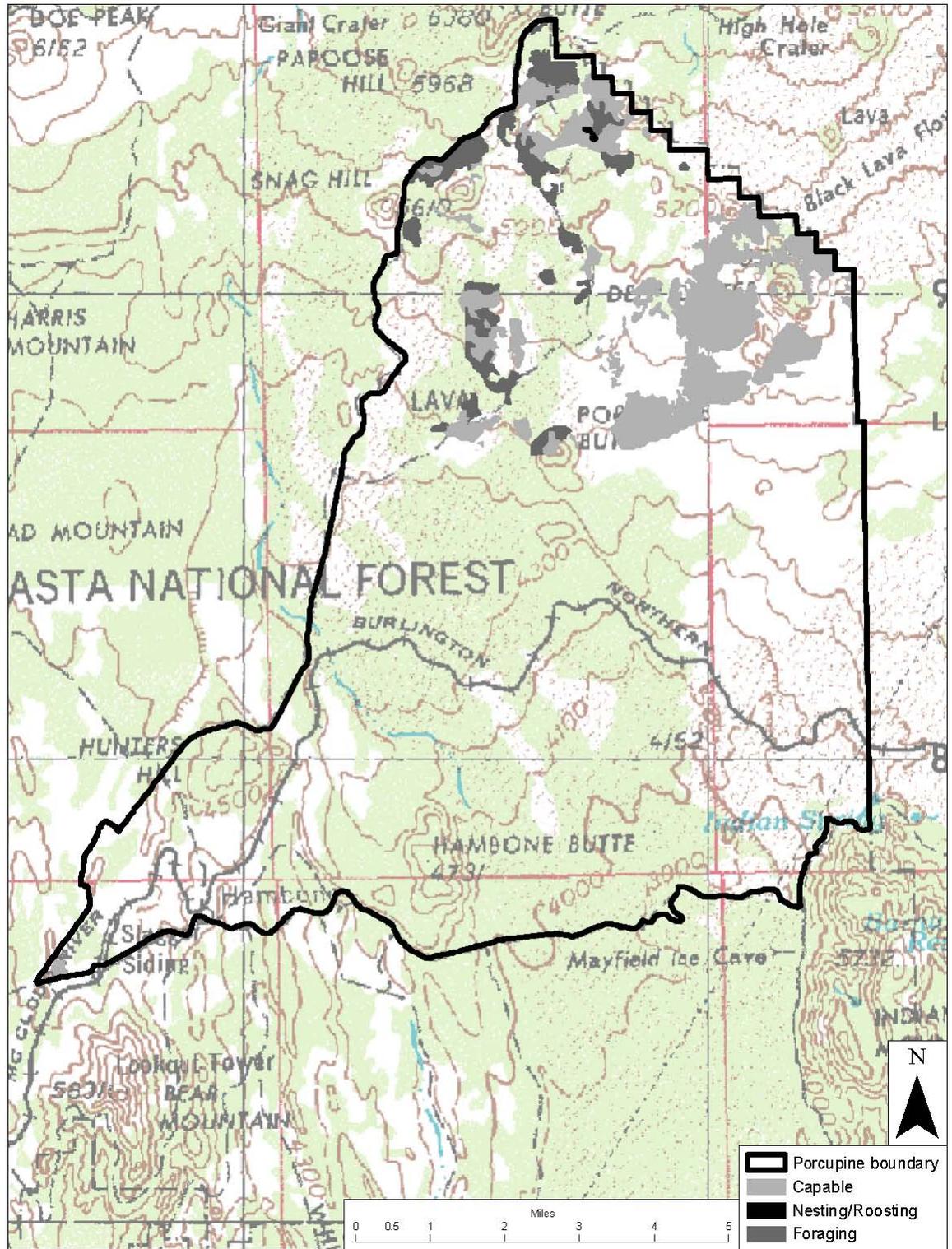


Figure 2. Northern spotted owl California baseline habitat within the project boundary

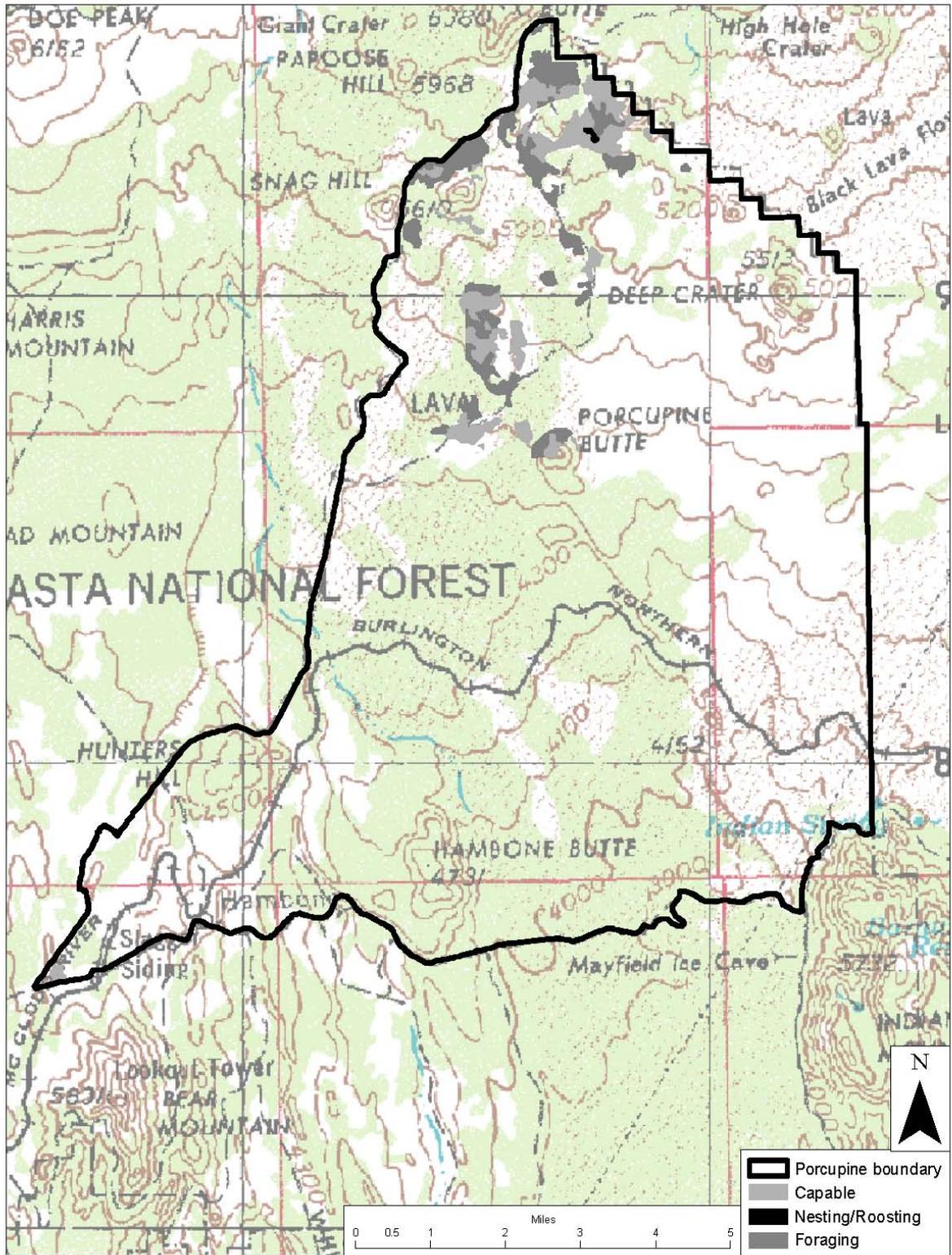


Figure 3. Modified baseline northern spotted owl habitat found within the Porcupine project boundary

## Effects Analysis

### *Environmental Consequences Common to All Action Alternatives (1, 2, and 3)*

The action alternatives could increase the potential for northern spotted owls to be impacted by West-Nile Virus through stand thinning activities and the responding increase of tall grasses. However the extent and duration of these potential impacts are unknown because the change of suitable habitat for mosquitoes is not reliably predictable or measurable at this time due to variations in weather, among other factors.

No barred owls have been located in or near the Project boundary. As stated above, barred owls may utilize older forests as well as more typical habitat associated with younger forests. Simplifying the stand structure by reducing the understory and canopy closure could make more habitat available for barred owls at the expense of northern spotted owls. However, given the current absence of barred owls in the Project area and the goal of providing long-term, sustainable northern spotted owl habitat, this risk is believed to be minor.

Road closures could not impact northern spotted owls because the proposed closures do not coincide with any existing or capable northern spotted owl habitat. Chip sealing along the Powder Hill Road near the Porcupine LSR could affect northern spotted owls from Six Shooter Butte if the owls are present and maintenance activities occur from February through August. This could be a disturbance effect, but would be difficult to differentiate from the normal vehicle traffic already present.

### *Environmental Consequences Specific to Alternatives 1 and 3*

Proposed treatments in spotted owl habitat under these alternatives would concentrate on removal of understory and subdominant trees. Figure 1 above displays the location of proposed treatments in the Project area. About 375 acres of northern spotted owl foraging habitat and about 414 acres of capable habitat could be affected with implementation of either of these alternatives (see Table 11 below). Treatment prescriptions within these identified areas include biomass thin, hazard reduction thin, mature stand thin, and standard thin. These areas would likely continue to provide suitable foraging habitat in both the short- and long-term, but the quality could be diminished due to initial treatment impacts such as decreased total canopy closure, decreased understory composition, and reduced structural complexity. Officially, the affected foraging habitat will be “degraded”.

The same amount of foraging and capable habitat in the spotted owl territory would be treated under Alternatives 1 and 3. In the nest core, about four acres (less than one percent) of foraging habitat would be treated by mechanical means and pile burning. In the home range, about 102 acres (7 percent) of foraging habitat and 37 acres of capable habitat would be treated by mechanical means and pile burning. Treatments are described in Table 10 below.

**Table 10. Treatments in the northern spotted owl nest core and home range under Alternatives 1 and 3**

Northern spotted owl habitat feature	Treatments	Acres affected	Silvi Tx	Fuel Tx
<b>Nest core</b> (525 foraging acres, 95 capable acres)	Hazard reduction thin	4 foraging	Mech WTY <sup>1</sup> , SL <sup>2</sup> , MP <sup>3</sup>	Pile burn, burn landings
<b>Home range</b> (1369 foraging acres, 288 capable acres)	Hazard reduction thin	35 capable	Mech WTY -33 acres	Hand pile, burn piles
			Mech WTY, SL, MP – 2 acres	Pile burn, burn landings
	Hazard reduction thin	102 foraging	Mech WTY – 14 acres	Hand pile, pike burn, burn landings
			Mech WTY, SL, MP – 88 acres	Pile burn, burn landings
Standard thin	2 capable	Mech WTY	Burn landings	

<sup>1</sup>Mechanical whole tree yard; <sup>2</sup>Slash; <sup>3</sup>Machine pile

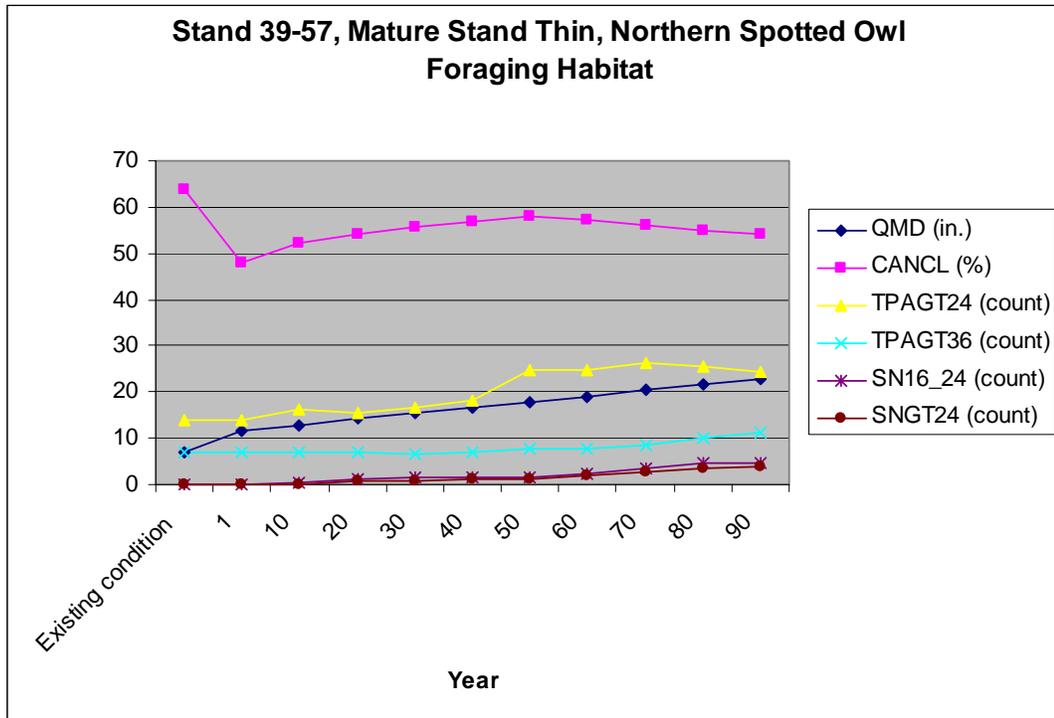
In existing suitable foraging habitat, silvicultural prescriptions would retain a minimum of 40 percent canopy closure, maintain the largest trees on site, and maintain at least the minimum snag and down wood requirements according to the LRMP and allocation objectives in mid-successional stands. In late-successional stands, prescriptions would be the same, but would retain 60 percent canopy closure. Silvicultural treatment projections predict an initial decrease in canopy closure, followed by increases in canopy closure, average diameter, as well as snag and down wood size classes throughout a ten decade term (See the vegetation report for more details.) Example treatments for late- and mid-successional dense stands can be seen below in the following figures and by comparing these to no treatment (Alternative 4). For further discussion, see the vegetation report and Appendix J of the Porcupine LSR Assessment. The treatments proposed in these alternatives are expected to maintain all or improve several characteristics of northern spotted owl habitat while reducing the risk of stand replacing events to these habitats. Because all foraging habitats that are proposed for treatments are expected to remain foraging habitat following treatments, there would be no loss of foraging habitat in the short- or long-term. There would only be temporary disruptions to the habitat while the activities were occurring. Ground vegetation and shrubs could be expected to return within one decade in areas where machinery and/or fire removed them during implementation. Reductions in ground vegetation cover and shrubs could impact prey availability, so there could be a short- to mid-term reduction in foraging habitat quality in parts of the treated stands. These effects could be localized and may not adversely affect all of the treated stands. About 42 percent of existing foraging habitat could be affected which could leave more than half of available foraging habitat not impacted. In capable habitat where trees per acre are high and tree diameter has peaked, thinning could lead to increased diameter of residual trees, and this could be a habitat improvement for that attribute.

Figures 4 and 5 depict expected example changes to six habitat characteristics for a couple of proposed treatment units. By comparing Figures 4 and 5 with Figures 6 and 7, one can see the differences between thinning and not thinning the example stands. Although the existing canopy closures are above 60 percent and by that attribute alone could be nesting and roosting habitat, other factors make it more suitable for foraging habitat instead, most notably a general lack of

water in the Project area and small average diameter of trees. The treatment scenarios show increases in average diameter of trees overall and number of large-diameter trees. The remaining treatment units in northern spotted owl habitat could be expected to have similar results following full implementation. Table 10 below describes what is contained in the legends of these two figures. Under each prescription, trees per acre would be reduced from 790 to 244 in stand 39-57, and from 782 to 98 in stand 39-61. Likewise, basal area, as a measure of square feet per acre, would be reduced from 217 and 200 square feet/acre to 182 and 160 square feet/acre, respectively. The largest, dominant trees would be retained in clumps, as opposed to even spacing, and would include trees with broken tops or other damage, as these are preferred nesting and roosting candidates.

**Table 11. Description of the legend for the tables used in this northern spotted owl analysis**

Legend item	Description	Measure
QMD	Quadratic mean diameter (i.e., dbh, diameter at breast height)	Inches – average dbh of the remaining trees in the stand
CANCL	Canopy closure	Percent overhead canopy closure – (for example 40 percent)
TPAGT24	Trees per acre greater than 24 inches dbh	Averaged Count
TPAG36	Trees per acre greater than 36 inches dbh	Averaged Count
SN16_24	Snags per acre 16-24 inches dbh	Averaged Count
SNGT24	Snags per acre greater than 24 inches	Averaged Count



**Figure 4. Stand 39-57; effects to various characteristics of northern spotted owl foraging habitat after proposed mature stand thin treatment**

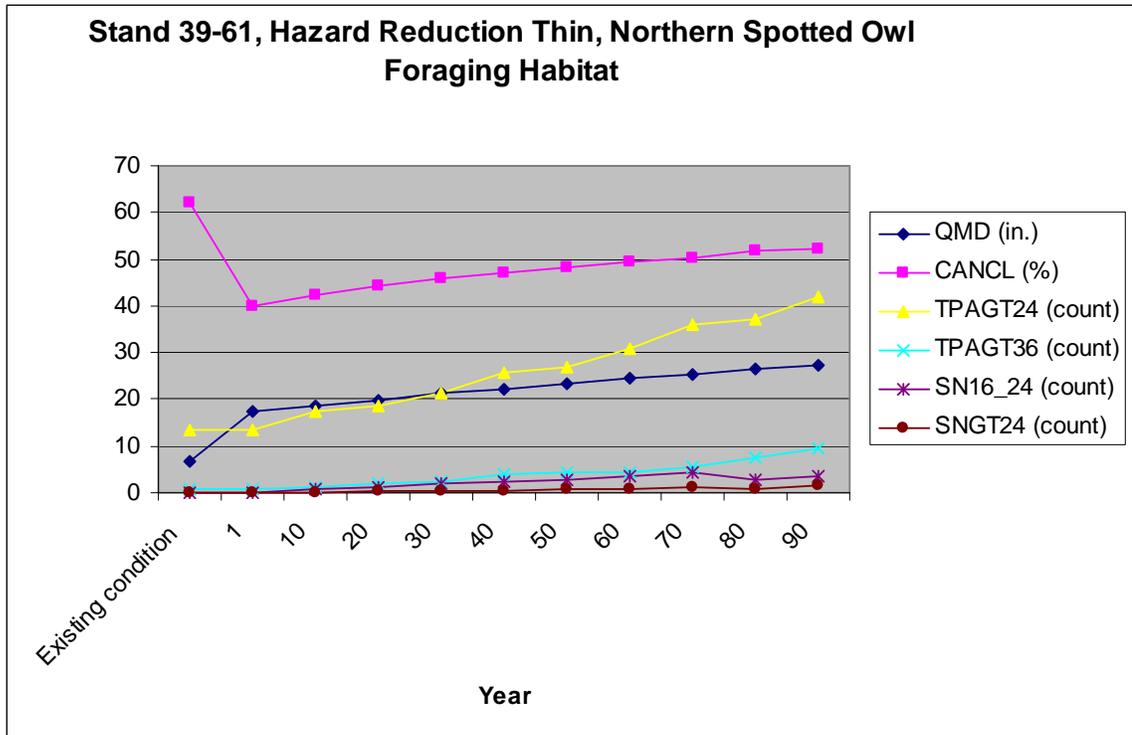


Figure 5. Stand 39-61, proposed hazard reduction thin in northern spotted owl foraging habitat

The Modoc habitat zone on the far eastern edge of the Shasta-Trinity National Forest is best considered as strictly having the potential for foraging and dispersal habitat with limited nesting and roosting capacity. Risk reduction through silvicultural and fuels treatments would likely enhance the long-term availability of foraging and dispersal habitat. Short- to mid-term (0-20 years) reductions in suitability (quality) in some stands would likely be offset by long-term (30-100 years) gains in reduced risk of stand-replacing insects/disease outbreaks<sup>21</sup>. Assuming fuels treatments occur at recommended intervals (5-15 years), stand-replacing wildfire risk likewise could be reduced<sup>22</sup>.

The existing single stand of nesting and roosting habitat within the project area would remain as it is and is not being considered for any activities. Treatment objectives in adjacent stands are expected to increase the quality of the stands and over time are expected to increase the amount of nesting and roosting habitat adjacent to that existing nesting and roosting stand. That is, the expectation of the treatments within the mid- and late-successional stands near the existing nesting and roosting stand would eventually produce a larger stand with potential nesting and roosting structural characteristics. This larger stand of nesting and roosting habitat could then be maintained for a longer period of time.

Because a northern spotted owl has been located within the project area only once, no habitat at that location would be treated, all other responses have been located outside the Project boundary, and there is a breeding season limited operating period in effect, direct effects to known northern spotted owls are discountable.

<sup>21</sup> McCusker, N. 2008. Porcupine Vegetation and Road Management Project Silviculture Report (draft). Unpublished report on file at Shasta-Trinity National Forest. 24 pages.

<sup>22</sup> Hall, R. 2008. Porcupine Vegetation and Road Management Project Fuels Report (draft). Unpublished report on file at Shasta-Trinity National Forest. 20 pages.

### *Environmental Consequences Specific to Alternative 2*

The effects to northern spotted owl habitats are expected to be the same as under Alternatives 1 and 3, except that less existing foraging and capable habitat would be treated. The areas being excluded from treatment are all within the Porcupine LSR. About 293 acres of foraging habitat and about 325 acres of capable habitat outside the Porcupine LSR would be treated under Alternative 2 (see Table 12 below). Effects to the northern spotted owl habitat outside the LSR boundary would remain the same as in Alternatives 1 and 3. Stand responses to treatments in foraging habitat are expected to be similar to those shown in figures 4 and 5 above.

About 55 acres (four percent) of foraging habitat in the Six Shooter Butte home range would be treated under this alternative by mechanical means and pile burning.

In the Porcupine LSR, dense stands could continue to be at risk for insect and disease outbreaks and at risk for stand-replacing fire.<sup>23</sup> Large-scale losses of habitat due to these factors would remove habitat from suitable status for 30-40 years until stands become dense enough and trees large enough to once again become suitable foraging habitat. So long as none of these events occur, existing habitat status could remain the same. Although canopy closure may increase to meet minimum nesting and roosting quality, lack of water and large-diameter trees could continue to limit nesting and roosting habitat quality. These stands would continue to hold foraging status without disturbance.

### *Environmental Consequences Specific to Alternative 4*

Under Alternative 4, the No Action alternative, no treatments would occur in any northern spotted owl habitat (see Table 12 below) and existing and capable habitat would continue to be at a higher risk for insect/disease infestations and stand-replacing wildfire. Under better climactic and soil conditions, existing northern spotted owl habitat classified as foraging would remain as such until which time it transformed into nesting/roosting habitat or is set back to capable due to an uncharacteristic stand-replacing wildfire or insect/disease infestation. However, due to the extremely dry climate, poor growing conditions in much of the project boundary, lack of riparian areas and corridors, and overall low habitat quality on this edge of the owls' range, habitat is unlikely to achieve good quality nesting and roosting characteristics before stands become susceptible to insects, disease, and fire. Risks for stand-replacing events due to such factors are currently moderate to high and would increase over time due to greater stand densities and fuel build-up<sup>24</sup>. Should stand-replacing events occur, much of the northern spotted owl habitat would become early-seral stage with small tree size and large openings and thus unsuitable for owls. Alternately, given the persisting shrub condition resulting from the 1950 and 1959 fires in the east edge of the Project area, there is a worst-case scenario that a severe wildfire could eliminate existing and capable habitat altogether for a long time. Large-scale losses of northern spotted owl habitat such as this could make this area even more marginal than existing conditions.

Modeled stand projections under the No Action alternative may show a suitable canopy closure and many snags per acre, for example, but these factors reflect many small-diameter trees in a crowded condition as opposed to stands with fewer, large-diameter trees and a complex, multi-storied canopy. See Figures 6 and 7 below for modeled no-action projections in the same example stands listed under the action alternatives (Alternatives 1, 2, and 3).

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<sup>23</sup> McCusker 2008 (see footnote 21)

<sup>24</sup> Ibid; McCusker 2008.

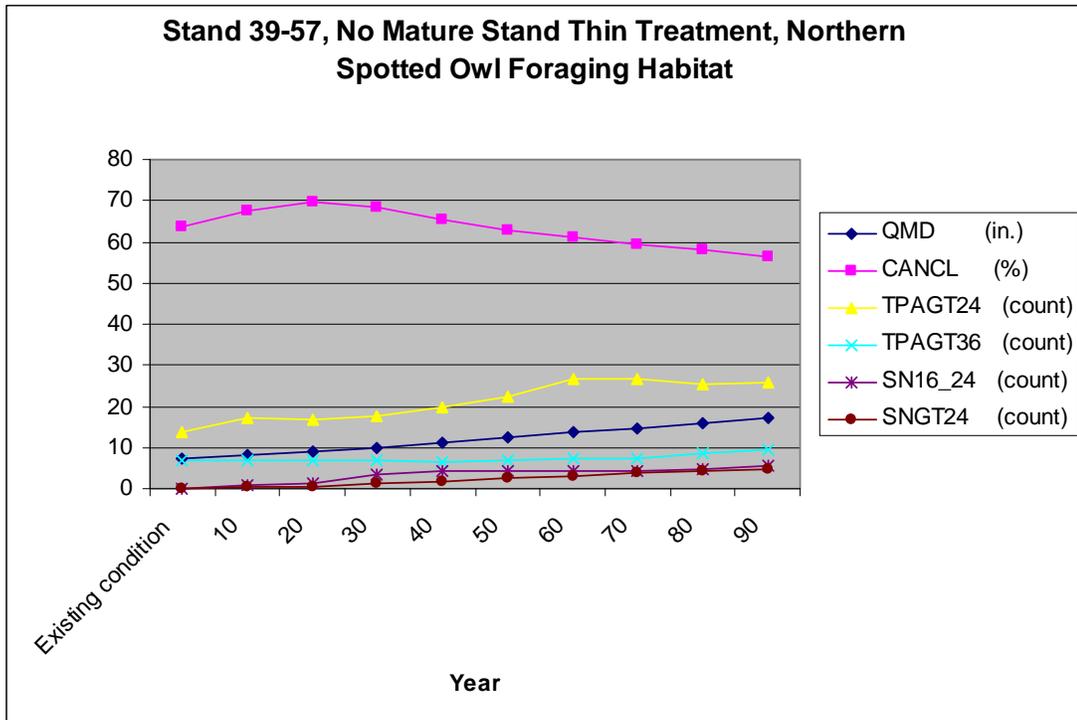


Figure 6. Stand 39-57, no mature stand thin treatment in northern spotted owl foraging habitat

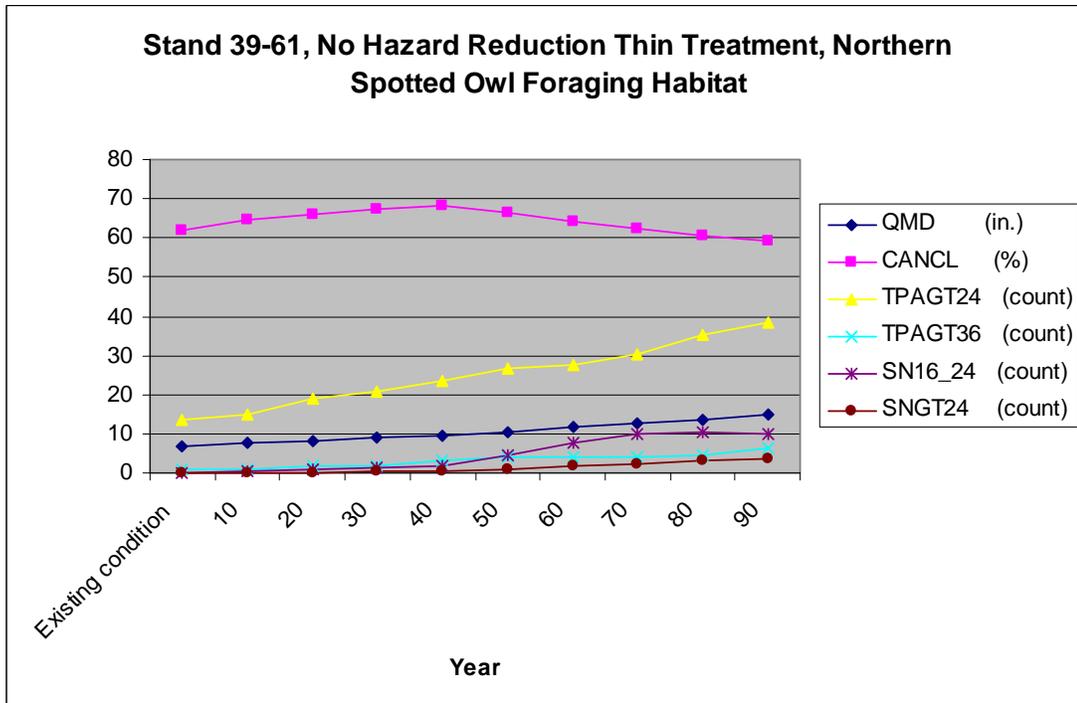


Figure 7. Stand 39-61, no hazard reduction treatment in northern spotted owl foraging habitat

**Table 12. Summary of potential treatments within northern spotted owl habitats and the resulting acres that would provide habitats following treatments compared to the existing**

Habitat Description	Existing Acres	Alt. 1 Acres Treated	Alt. 2 Acres Treated	Alt. 3 Acres Treated	Alt. 4 Acres Treated	Num. Acres Providing Habitat Following Proposed Treatment
Nesting/Roosting	13.5	0	0	0	0	13.5 (100%)
Foraging	891	375 (42%)	293 (33%)	375 (42%)	0	891 (100%)
Capable	1,232	414 (34%)	325 (26%)	414 (34%)	0	1,232 (100%)

*Cumulative Effects*

The cumulative effects area for northern spotted owl consists of all lands within 1.3 miles of the project area, which is the provincial radius for the northern spotted owl survey protocol. Adding the Modified Baseline northern spotted owl habitat acres to existing habitat outside the Project boundary may give an accurate reflection of available northern spotted owl habitat. Whereas some designated capable habitat inside the boundary was deemed unsuitable as a result of its status as a plantation, isolation/fragmentation, and lack of suitable mixed-conifer stands nearby, the plantations along the west side of the Porcupine Project boundary can be considered capable, at a minimum, because of their close relation in distance and proximity to other suitable habitat. Therefore, it is reasonable to assess the capable stands as being truly capable to one day become suitable northern spotted owl habitat on the west side of the Project. Table 13 below lists how much habitat is available within the cumulative effects boundary. Figure 8 displays the habitat within the northern spotted owl cumulative effects boundary.

**Table 13. Nesting, roosting, foraging, and capable acres of northern spotted owl habitat within the 1.3-mile cumulative effects boundary of the project**

Forest	Nesting/Roosting	Foraging	Capable
Shasta-Trinity	41.7 acres	2,966 acres	3,447 acres
Modoc	0 acres	380 acres	2,259 acres
Total	41.7 acres	3,346 acres	6,086 acres

**Alternatives 1, 2, and 3**

Suitable habitat was modeled for those portions of the Modoc National Forest in a manner like that done for the Shasta-Trinity NF where onsite visits determined the final suitability of habitat. The area lacks water sources, large-diameter trees, complex canopies, and suitable canopy closure, and as a result, most of the Modoc NF stands could not be habitat, even though the CalVeg GIS data indicates strata codes of suitable structure. Therefore, the modeled habitat on the Modoc NF near the Project is about 380 acres of foraging habitat and about 2259 acres of capable habitat. It should be noted that the current, and in particular the capable, habitat is a conservative figure due to the aforementioned reasons.

Within the cumulative effects area there are two additional, small stands of nesting and roosting habitat totaling about 28 acres. They were treated by the Powder project with jackpot fuel burning, therefore maintaining their habitat status as nesting and roosting. No owls responded to surveys for the Powder project. Also as a result of these treatments, the stands are in a condition to provide long-term owl habitat.

In 2006 and 2007, surveys detected a northern spotted owl adjacent to the project area on Six Shooter Butte. In the summer of 2007, a researcher captured two owls on Six Shooter Butte, one male and one female.<sup>25</sup> The male had been banded in 1999 and the female was banded on site. There was no sign of breeding. A modeled home range near Six Shooter Butte, based on response locations, is outside the project area boundary for the most part, yet it is plausible that owls could use portions of the Project area. Direct effects to the known owls in that modeled home range are unlikely because 1) owls have been located within the project area only once, and 2) vegetation treatments would occur outside the breeding season in those stands that could be a part of that home range.

Potential short-term, disturbance effects to northern spotted owls could result from treatment activities taking place near owls or in northern spotted owl habitat. Disturbance to northern spotted owls near Six Shooter Butte from February through August are discountable due to a limited operating period buffer for a nearby northern goshawk territory. Therefore, the action alternatives would not contribute to any disturbance during that period.

Northern spotted owl use of the Project area is limited to one known observation, but it is suspected that owls may use more of the area. Foraging habitat is available near Six Shooter Butte and in the Project area boundary. Should owls use existing habitat south and east of Six Shooter Butte, inside the Project boundary, some habitat could be impacted. However, most of the contiguous habitat in the modeled home range lies on Six Shooter Butte and to the northwest lies an adjacent large, contiguous block of foraging habitat (nearly 1,600 acres). There have been other projects on and near Six Shooter Butte which have included thinning and small clearcuts, totaling about 260 acres. These stands are currently classified as capable habitat.

The Forest activities database lists many timber sales, salvage sales, plantation management activities, thinning, and other vegetation management in the Project area. The northern spotted owl habitat that has been affected from these activities is summarized in Table 14 below. Not all northern spotted owl habitat has been adversely affected. For example, although about two-thirds of the available nesting and roosting area has been affected, the management activities were pile burning to reduce excess fuel accumulations, and thereby maintained or improved habitat, at least for that attribute. Likewise, thinning in foraging habitat (especially in mixed conifer stands) to a minimum 40 percent canopy closure maintained minimum canopy closure guidelines and reduced insect/disease and fire risk in those stands. Recent projects that treated stands in northern spotted owl habitat include Bear Mountain, Davis, and Powder, all near the south and west edge of the Porcupine Project. These projects are nearly complete. Maintaining minimum 40 percent canopy closure guidelines in these projects should have maintained northern spotted owl foraging habitat status. Parts of treated stands may not be used immediately after treatments because ground vegetation and shrubs may require up to ten years to return and provide quality prey species habitat. However, there should be sufficient quantity and quality of vegetation remaining post-treatment. Thus, the amount of foraging habitat should remain the same in those projects and in the cumulative effects area. There were no spotted owl responses to survey for these projects.

Thinning treatments in capable habitat could increase residual tree size beyond that which could occur naturally in very dense stands, thus moving capable habitat closer to developing into foraging habitat of a better quality than could be found in those dense stands.

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<sup>25</sup> Derby, D., Wildlife Biologist, Shasta-Trinity National Forest. 2007. Personal communication.

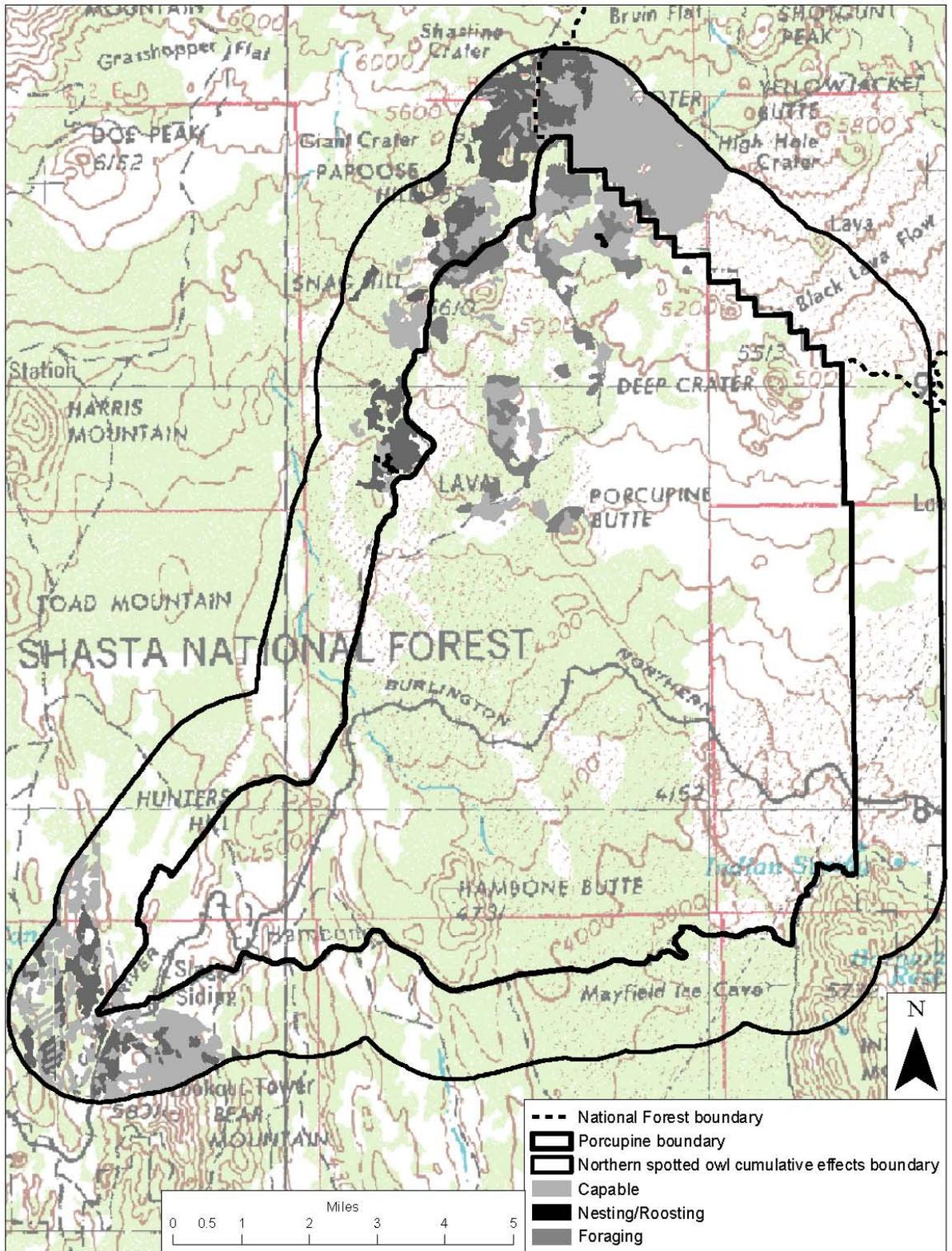


Figure 8. Nesting, roosting, foraging, and capable northern spotted owl habitat within the project cumulative effects boundary

**Porcupine Vegetation Management Project**

No activities data was available for the Modoc National Forest, but most of the adjacent areas of the Modoc NF near the Project are moderately sparse stands of fir or mixed conifer occurring in lava flows. Examination on the ground and using aerial imagery (NAIP) shows very little vegetation alteration, and those areas where past activities have occurred are on Six Shooter Butte.

Table 15 below summarizes the cumulative effects area for the Porcupine project.

**Table 14. Acres affected by past projects in the cumulative effects area**

Northern Spotted Owl Baseline Habitat in the Cumulative Effects Area		Northern Spotted Owl Habitat Affected by Other Activities in the Cumulative Effects Area
Foraging habitat	3,346 acres	2,115 acres (63.2%)
Nesting/roosting habitat	41.7 acres	28 acres (67.1%)
Capable habitat	6,086 acres	1,381 acres (22.7%)
Total	9,432 acres	3,524 acres (37.4%)

**Table 15. Porcupine project contributions to cumulative effects (acres and percent)**

Project Additions to the Cumulative Effects Acres				Cumulative Acres of Northern Spotted Owl Habitat Affected		
Alternative	Foraging Habitat	Nesting/Roosting Habitat	Capable Habitat	Foraging Habitat	Nesting/Roosting Habitat	Capable Habitat
Alt. 1	360	0	400	2,475 (73.9%)	28 (67.1%)	1,781 (29.3%)
Alt. 2	284	0	317	2,399 (71.7%)	28 (67.1%)	1,698 (27.9%)
Alt. 3	360	0	400	2,475 (73.9%)	28 (67.1%)	1,781 (29.3%)
Alt. 4	0	0	0	2,115	28	1,381

**Alternative 4**

Although there could be an increasing risk of forest habitat loss from insects, disease, and fire due to the no-action alternative, there is no means to accurately predict when such an event could occur and how much it could affect northern spotted owls and their habitat at this time. Therefore, there could be no cumulative effects from Alternative 4.

*Determination*

**Alternatives 1, 2, and 3**

It is my determination that full implementation of Alternatives 1, 2, or 3 may affect, but is Not Likely To Adversely Affect the northern spotted owl.

It is my determination that full implementation of Alternatives 1, 2, or 3 would have No Effect on northern spotted owl critical habitat.

#### Alternative 4

It is my determination that implementation of this alternative would have No Effect on northern spotted owls or their critical habitat.

#### Rationale for Determination(s)

- There is no designated northern spotted owl critical habitat within the Project area.
- A northern spotted owl has only once been detected inside the Project area boundary, and this location is not under any proposed management. Other locations have been over 0.25 miles or further away, outside the project boundary.
- A limited operating period from February 1 through August 31 precludes any activity in the Porcupine LSR, thus eliminating any potential disturbances during the breeding season.
- Existing northern spotted owl foraging and dispersal habitat would be “degraded” but would remain as suitable foraging and dispersal habitat under the action alternatives (1, 2, and 3).
- Less than one percent of the existing nest core foraging habitat and about seven percent of the home range foraging habitat would be “degraded”, yet would retain foraging status under Alternatives 1 and 3. Alternative 2 would “degrade” about four percent of the existing foraging habitat in the home range, yet that stand would retain foraging status.
- Treatment prescriptions in suitable foraging and dispersal habitat would reduce risk of forest habitat loss due to insects, disease, and wildfire, in addition to maintaining habitat suitability for a longer period of time than without treatment.
- The natural fragmentation of the suitable habitat in the landscape reduces the chances it would be utilized as a substantial portion of a northern spotted owl home range.
- The only habitat capable of currently providing adequate nesting and roosting habitat would not be entered. No nesting and roosting habitat would be “downgraded” or “removed.”
- Because Alternative 4 (No Action) would not directly alter or make a decision regarding any designated critical habitat and no activities would take place within the project area, there would be no potential for measurable effects at this time.

#### Northern Goshawk

The northern goshawk (*Accipiter gentilis*) is an uncommon forest raptor and a sensitive species listed for the Shasta-Trinity National Forest.

Goshawks in the western U.S. prefer nesting in mature and old-growth conifer forests that have relatively dense canopy closures, little understory, and are in close proximity water.<sup>26</sup> Nest trees are typically of the oldest and largest trees in a dense stand that averages 60-95 percent canopy closure.<sup>27</sup> However, they are also known to be mature forest generalists across their range. In

<sup>26</sup> Squires, J. R. and R. T. Reynolds. 1997. Northern goshawk (*Accipiter gentilis*). Birds of North America Online (A. Poole, Ed.). Ithaca, New York. Cornell Laboratory of Ornithology. 26 November 2007. <http://bna.birds.cornell.edu/bna>.

<sup>27</sup> Ibid.

addition, goshawks are generalists in their foraging habitats. They hunt small mammals and birds.

### Existing Conditions

The area east of McCloud has been an intensively managed forest starting with railroad logging in the early 1900s. The McCloud area has over 33 managed goshawk territories. The flat topography and thinning in stands to enhance tree growth has generally promoted goshawk habitat. Territories on the Shasta-McCloud Management area generally occupy areas in excess of 1-2 square miles.

One known northern goshawk territory exists on the north end of the Project area, including portions of the Modoc National Forest. This pair was known to exist prior to 2006, but the first documentation of nesting was in 2006. Two nesting areas (primary and secondary), each a minimum of 125 acres, were modeled using the best available habitat near the known nest location. The nesting territory has been monitored by the Shasta-McCloud Management Unit since that time. In 2006, this pair fledged two young goshawks. Between the 2006 fledging and 2007 nesting seasons, the 2006 nest blew down; the goshawks used an alternate nest less than 50 meters away which was located by the Shasta-McCloud Management Unit wildlife crew. Part of their territory is in the Porcupine LSR and part of it lies to the west, on Six Shooter Butte.

There are enough acres of available habitat distributed in a pattern to provide habitat for one or two home ranges within the Project boundary and two partial home ranges near the Project boundary. One partial home range is occupied (near Six Shooter Butte on the north end) and one is likely occupied near the southwest corner (goshawks have been seen nearby). See Figure 10 for the distribution of habitat, proposed units, and theoretical home ranges.

Goshawks have been observed in and near manipulated stands, in particular near Six Shooter Butte and near the south edge of the project boundary.

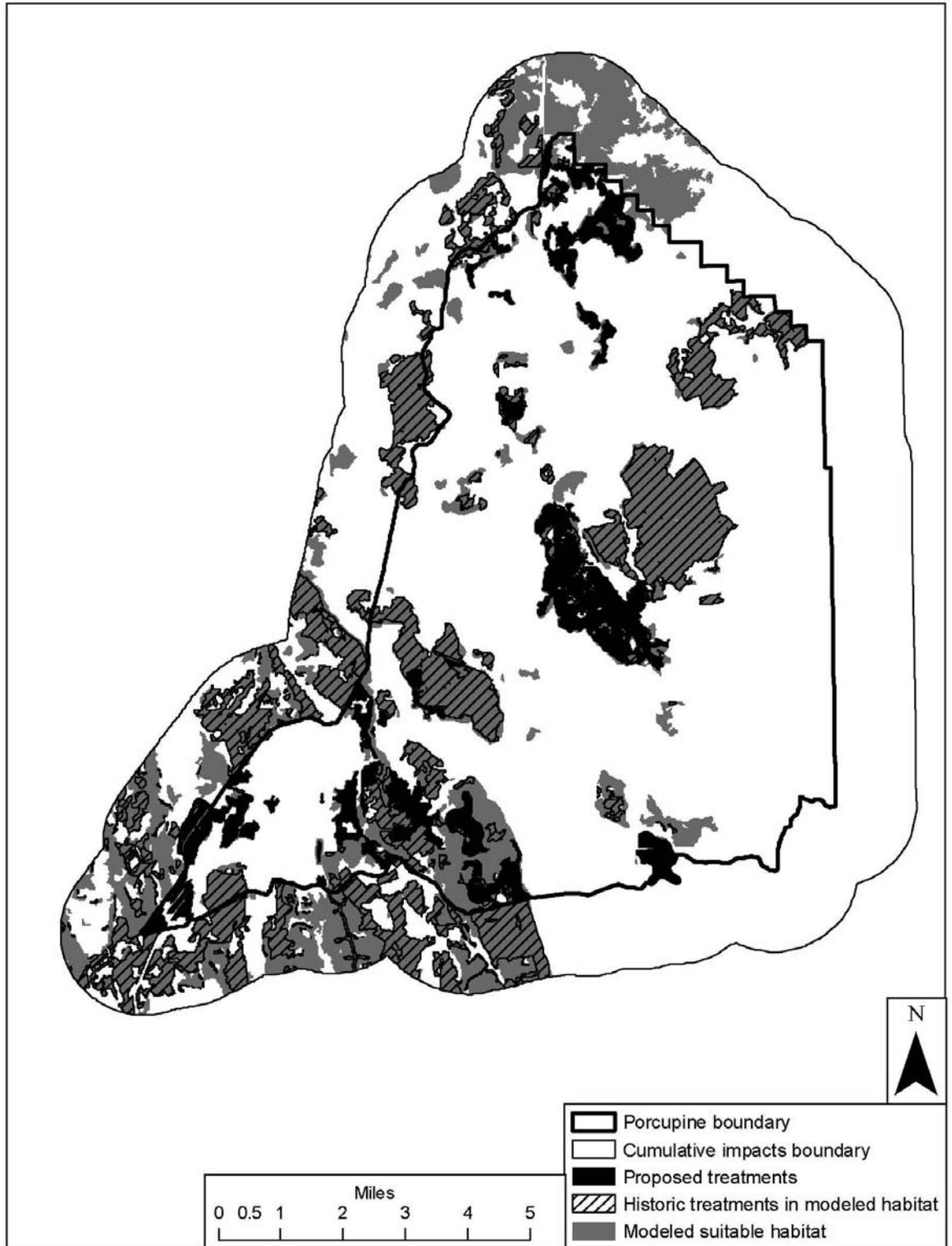
LSR management is expected to provide nesting habitat for the northern goshawk as it is a late-successional dependent species for nesting needs. Due to the northern goshawks generalist foraging behavior and habitat use, more than just the LSR can be considered suitable foraging habitat. There are about 11,942 acres of potential goshawk foraging habitat in the Project area.

### Impacts Analysis

#### *Environmental Consequences Specific to Action Alternatives (1 and 3)*

Direct impacts to the known pair of goshawks are unlikely because a limited operating period (LOP) would be in place during the goshawk breeding season, which means no activity would occur in the goshawk primary or alternate nest territory or within one-half mile during that period. Therefore, direct impacts to adults and young are unlikely in that area. No treatments are proposed for the actual nest stand, but there are treatments proposed for several stands surrounding the nest stand. These treatments would maintain a minimum of 40 percent canopy closure and would not be implemented during any nesting period.

Disturbance impacts near the goshawk nest site are unlikely due to the LOP, as well. Goshawks could experience some disturbance if foraging near locations where treatment activities are taking place; however, the goshawk could, and probably would, avoid activity areas due to noise or smoke.



**Figure 9. Northern goshawk suitable habitat and historic treatments in the cumulative impacts boundary, and proposed treatments in the project boundary**

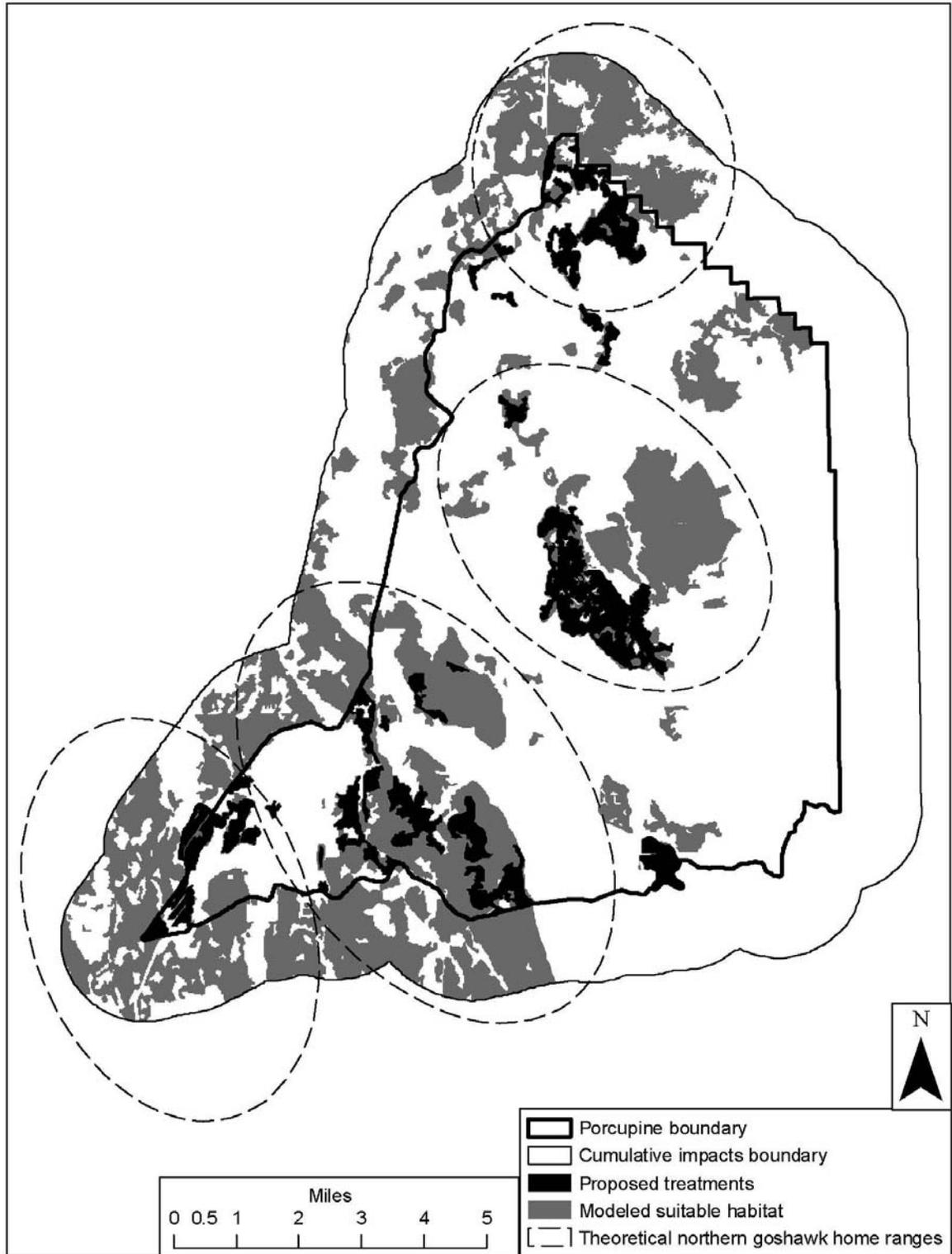


Figure 10. Theoretical Northern goshawk home ranges in the porcupine project boundary and vicinity

About 3,346 acres of suitable habitat for northern goshawks could be impacted, of which about 134 acres are within the LSR. The proposed treatments in mid- and late-successional dense stands would result in decreased canopy closure (but maintaining a minimum of 40 percent canopy closure), understory vegetation, and down wood. In these, stands this could be short-term (about ten years) as the post-treatment stand projections show larger diameter overstory trees, minor increases in canopy density, and increases in down wood over a ten-decade term. Treatments are expected to increase the diameter-at-breast-height and the crown diameter of the residual trees, which could increase long-term nest site availability. Canopy closure is not expected to increase to its current levels in some of the treated stands even in the long-term, but is expected to be maintained above 40 percent throughout the next 100 years. In pine-dominated stands, canopy closure could be thinned to about 40 percent for silvicultural reasons and this could still remain foraging habitat. Although goshawks are not present in all suitable habitat in the Project, long-term maintenance of suitable habitat would ensure future dispersal and foraging habitat for goshawks.

#### *Environmental Consequences Specific to Alternative 2*

This alternative is expected to have similar direct and indirect impacts to goshawks and their habitat as Alternatives 1 and 3. This alternative would not treat any stands in the Porcupine LSR and therefore could not treat any stands near the modeled goshawk territory. Under this alternative, it is unlikely there could be any disturbance to known northern goshawks. This alternative could thin stands in about 3140 acres of northern goshawk habitat outside the Porcupine LSR. Habitat impacts would remain the same as in Alternatives 1 and 3.

#### *Environmental Consequences Specific to Alternative 4*

This alternative would not actively change any goshawk habitat. Because goshawk nesting habitat is related to late-successional habitat in LSRs and on Matrix lands, there could be continued and increasing long-term risks due to insects, disease, and fire resulting from overstocked stands. The amount of goshawk nesting and foraging habitat would remain the same as the existing condition until which time insects, disease or an uncharacteristic wildfire substantially change all or portions of the existing habitat.

#### *Cumulative Impacts*

The cumulative impacts boundary includes all lands within 1.3 miles of the project boundary. This distance is at least equivalent to the radius of a typical northern goshawk home range in this region. There are about 24,015 acres of goshawk habitat (primarily foraging) in this Cumulative Impact Area.

#### **Alternatives 1, 2, and 3**

Past projects have impacted about 11,332 acres of northern goshawk habitat in the cumulative impacts boundary through timber and salvage sales, plantation management, and thinning operations. There are three current projects that could impact northern goshawks: Bear Mountain, Davis, and Powder. During these projects, goshawks would likely forage elsewhere to avoid disturbance. The treated stands are all expected to remain viable as goshawk foraging habitat as they were managed to retain late-successional habitat where it occurred. These activities, like those proposed for the Porcupine Project, are expected to reduce the risk from stand replacement events such as insect, disease, and fire. Table 16 and Table 17 below display impacts to northern goshawk habitat in the Project and cumulative impacts areas.

The Porcupine Project may add cumulatively to the amount of impacted habitat across the cumulative impacts area. The status of goshawk habitat is unlikely to change in the long-term because existing habitat should remain suitable habitat. Ongoing projects in goshawk habitat involve thinning treatments in mixed conifer stands where canopy closure is maintained at or above 40 percent.

**Table 16. Acres of Northern Goshawk habitat impacted by each alternative**

Goshawk Habitat in Project Boundary	Goshawk Habitat Impacted by Alternative			
	Alt. 1	Alt. 2	Alt. 3	Alt. 4
11,942 Acres	3,346 Acres (28.0%)	3,140 Acres (26.3%)	3,312 Acres (27.7%)	0 Acres (0%)

**Table 17. Acres and percent of Northern goshawk habitat impacted in the cumulative impacts area**

Goshawk Habitat in the Cumulative Impacts Boundary	Goshawk Habitat Impacted by Other Actions in the Cumulative Impacts Boundary	Cumulative Acres of Impacted Northern Goshawk Habitat			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4
24,015 Acres	11,332 47.2%	14,680 61.1%	14,472 60.3%	14,644 (60.9%)	11,332 47.2%

**Alternative 4**

Although there could be an increasing risk of forest habitat loss from insects, disease, and fire due to the no-action alternative, there is no means to accurately predict when such an event could occur and how much it could impact northern goshawks and their habitat at this time. Therefore, there could be no cumulative impacts from Alternative 4.

**Determinations**

**Alternatives 1, 2, and 3**

It is my determination that all Action Alternatives (1, 2, and 3) may impact individuals, but is not likely to result in a trend towards federal listing or loss of viability for the northern goshawk.

**Alternative 4**

It is my determination that Alternative 4 would have no impact on northern goshawks or their habitat.

*Rationale for Determinations:*

- A limited operating period would limit disturbance, if any, at the known nest to times outside the breeding season, therefore the disturbance impacts would not be substantial.
- The nest stand would not be directly impacted by treatments. Treatments within the home range would retain a minimum 40 percent canopy density and existing levels of snags and down logs, and as such these stands would continue to provide suitable habitat.
- In the long-term, treatments in suitable goshawk habitat would reduce stand replacement risks in those treated habitat acres.

- Current habitat suitability could remain the same following full implementation of the project for any action alternative with minimum canopy closure and snag and down log retention
- Trees preferred for nesting are targeted for retention in all units, thus maintaining available nest trees across the project area.
- The McCloud Flats area has over thirty known northern goshawk territories and is intensively managed; proposed treatments would maintain parts of at least one, and likely two territories in suitable condition.
- No known goshawk habitat would be directly impacted by any treatments with implementation of Alternative 4.
- Although Alternative 4 is making a decision on the management of many acres of goshawk habitat, because no measurable impacts would result from the lack of treatment, no impact is the proper determination.

### *Pallid Bat*

The pallid bat is associated primarily with dry environments. Foraging may be concentrated in riparian areas where available, for invertebrates,<sup>28</sup> but foraging sites are typically arid and only occasionally will pallid bats use conifer woodlands.<sup>29</sup> Roost sites are rock crevices, buildings, under bridges, caves/mines, and less often in trees.<sup>30</sup> Preferred hibernacula consist of caves.<sup>31</sup> Foraging distances are unknown, but travel distances between day and night roosts were estimated to be less than two miles.<sup>32</sup>

### Existing Conditions

The open and shrub-dominated areas of the project are the most likely suitable pallid bat habitat. In addition, some of the more open forested lands within the project area could provide suitable foraging habitat and roost sites. Roosting habitat may be present in the form of cracks in lava flows, several old buildings and bridges, and cracks in isolated trees or snags. Foraging habitat can be found in any dry, open sight that is not dominated by trees, including the following types: barren or non-forested, grass, young plantations, and sparsely covered forest types found in the “planter-pot” lava fields.

Within the project area, there are about 26,195 acres of habitat that pallid bats may frequent. This consists of about 4,088 acres of non-forested land; 110 acres of grassland; 7,088 acres of shrub; and 14,909 acres of lower quality pine and mixed conifer forested areas with canopy closures less than 40 percent. Much of the pine and mixed conifer types considered as habitat are dry sites located on otherwise barren lava flows.

### Impacts Analysis

#### *Environmental Consequences Specific to Action Alternatives (1, 2, and 3)*

Habitat requirements for pallid bats are vague with the exception of roosting and hibernacula. Therefore, because foraging habitat is not well defined, foraging activities occur after dark, and

<sup>28</sup> NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life[web application]. Version 6.2. Arlington, Virginia. NatureServe. November 14, 2007 Available <http://www.natureserve.org/explorer>.

<sup>29</sup> Hermanson, J. W. and T. J. O'Shea 1983. "Antrozous pallidus." *Mammalian Species* **213**: 1-8.

<sup>30</sup> Ibid; NatureServe 2007.

<sup>31</sup> NatureServe 2007.

<sup>32</sup> Hermanson and O'Shea. 1983.

proposed treatments would not substantially affect preferred prey species abundance or distribution, this impact analysis will concentrate on day and night roost areas in addition to likely hibernacula.

The action alternatives could affect up to 533 acres of forested lands of the identified 14,909 acres of forested portion of the modeled pallid bat habitat (see Table 18 below), that contains snags potentially used for day or night roosts. Although snags will be retained at or above Forest Plan levels, it is likely that some existing snags will not survive all proposed activities. Therefore, individual roosting bats could be directly or indirectly impacted by the activities on these acres. Long-term roosts and hibernacula would not be directly impacted by any proposed activities other than short-term disturbances from noise within these activity areas. The known caves in the area would not have any activities associated with any of the action alternatives and therefore, would be well protected.

**Table 18. Acres and percent of Pallid bat habitat within the Porcupine project boundary and impacts by alternative**

Pallid Bat Habitat in the Project Boundary	Forested Portion of Pallid Bat Habitat in the Project Boundary	Pallid Bat Habitat Impacted by Alternative						
		Alt. 1		Alt. 2		Alt. 3		Alt. 4
26,159 Acres	14,909 (57.0%)	562 (2.1%)	511 Forested Acres (3.4%)	492 Acres (1.9%)	447 Forested Acres (3.0%)	583 Acres (2.2%)	533 Forested Acres (3.6%)	0 Acres (0%)

*Environmental Consequences Specific to Alternative 4*

There would be no direct or measurable indirect impacts as a result of implementing Alternative 4, as no activities would occur. Open habitats dominate the Project boundary and the Porcupine watershed and are under no threats. This habitat type is stable and therefore could provide pallid bat habitat for the long term.

*Cumulative Impacts*

The cumulative impact area for pallid bats is being established as the Project area boundary. This area was chosen because foraging bats can travel large distances, about 30 miles, and the most important feature of pallid bat habitat is their day and night roosts and hibernacula. Their roosts and hibernacula are immovable objects and would not likely be impacted by activities occurring outside of the project area and foraging abundance and quality are not likely to be substantially changed with vegetation management activities.

Multiple historic projects have occurred within the cumulative impact area that likely resulted in changes to the abundance and distribution of snags that are available for roosting habitat. It is unlikely that permanent roosts and hibernacula have been impacted negatively by management activities with the exception of temporary disturbances (i.e., noise). The protection (gating) of caves in the cumulative impact area has resulted in beneficial impacts to high quality hibernacula and potential roost sites. Many historic projects were not restricted by specific standards and guidelines for snag and leave tree retention. All ongoing, proposed, and future foreseeable

projects are restricted to leaving minimum amounts of snags and green trees for future snags. As such, there could be ample snags in the future to meet pallid bat needs.

Open habitats may persist from the large fires in the 1950s and are stable.

### **Cumulative Impacts Specific to Alternatives 1, 2, and 3**

In combination with all historic, ongoing and foreseeable future projects, the proposed Alternatives 1, 2, and 3 could have minor, incremental, negative cumulative impacts to pallid bats or their habitat. It is not believed that these cumulative impacts would be substantial because all permanent roosts and hibernacula habitat in addition to the retention of snags and green tree replacements throughout all proposed activity areas would maintain sufficient habitat availability for any pallid bats that may be utilizing portions of the project area.

### **Cumulative Impacts Specific to Alternative 4**

Because this alternative does not expect any impacts, there could be no cumulative impacts to pallid bats or their habitat.

## **Determinations**

### **Alternatives 1, 2, and 3**

It is my determination that Alternatives 1, 2, and 3 May Impact Individuals or Habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species for the pallid bat.

### **Alternative 4**

It is my determination that implementation of this alternative would have No Impact on pallid bats or their habitat.

### *Rationale for MIIH Determinations*

- Proposed treatments could remove some roosting sites (cracked trees or snags), yet still retain minimum numbers and sizes of snags and down wood. However, snags are not primary roost sites; only occasional individuals could be impacted.
- Primary roost sites in caves would not be impacted so nearly all bats in the colonies would not be impacted.
- Foraging habitat would not likely be substantially impacted by proposed activities because the bat forages in open conifer and other open shrub and grass-dominated cover that is not targeted for treatment in the action alternatives.

## ***Townsend's Big-eared Bat***

Townsend's big-eared bat is a generalist in its habitat preferences. Townsend's big-eared bat roost sites include caves, tunnels, trees, buildings and other man-made structures where they prefer total darkness.<sup>33</sup> Townsend's big-eared bats are particularly sensitive to disturbance.<sup>34</sup> It

<sup>33</sup> Pierson, E. D. and W. E. Rainey. 1998. Distribution, status, and management of Townsend's big-eared bat (*Corynorhinus townsendii*) in California. California Department of Fish and Game. Sacramento, California; NatureServe 2007.

<sup>34</sup> Pierson and Rainey 1998; NatureServe 2007.

forages in a wide variety of habitats, preferring riparian areas where available, but also utilizing shrub and forested areas where moths are the primary prey.<sup>35</sup>

### Existing Condition

Townsend's big-eared bats are present in the Project area and known roost sites exist in the lava tubes and caves throughout the project area. Riparian foraging areas are limited by the Project area hydrology, but suitable foraging can be found in the open, sparsely vegetated and forested areas throughout the rest of the Project area.

Bat roosting habitat on the Shasta-Trinity National Forest centers on caves, old buildings and bridges. As such, these structures are protected and managed so as not to disturb bats colonies by implementation of a 250-foot no harvest buffer around these structures and leaving large snags on site (LRMP 4-62).<sup>36</sup> Furthermore, snags can be utilized as roosting habitat. These features are important for wildlife habitat and as down woody debris are targeted for retention where they exist in forested areas.

Population declines of the Townsend's big-eared bat have generated concern in the state of California.<sup>37</sup>

Given the generalist foraging and roosting behavior of the Townsend's big-eared bat, including the western subspecies, all of the Project can be considered foraging habitat.

### Impacts Analysis

#### *Environmental Consequences Specific to Alternatives 1, 2, and 3*

Direct impacts such as injury and death, are unlikely to occur as a result of these alternatives. Likely roost sites are protected buildings, caves, and tunnels, and large snags that could be roosting sites could be retained onsite to meet wildlife habitat and snag and woody debris guidelines.

Disturbance and foraging habitat changes are the most likely indirect impacts. Disturbance at primary roost sites is unlikely to occur because these sites could not be impacted due to protection buffers and these sites are not in treatment areas. Individual and small groups of bats may roost in snags and thus could be disturbed during thinning and burning operations; however, these disturbances would be of short duration and would not impact a substantial part of the bat population as a whole. Most bats roost in locations that would not be impacted.

There could be impacts to foraging habitat in the forested areas as a result of thinning. However, forest structure overall could be maintained through retention of dominant trees, tree species, canopy density, and snags. Primary foraging habitat is in shrub-dominated areas and along forest edges, so treatments could not measurably impact overall foraging habitat.

#### *Environmental Consequences Specific to Alternative 4*

There could be no direct impacts as a result of the No Action Alternative as no activities would occur.

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<sup>35</sup> NatureServe 2007.

<sup>36</sup> USDA Forest Service 1995a.

<sup>37</sup> Pierson and Rainey 1998.

Indirect impacts of the No Action Alternative could be limited to minor losses of forest edge foraging habitat and the loss of some roosting snags in the event of a stand replacing fire. A loss of forest edge habitat and some snags could impact some individual bats, but would be unlikely to adversely impact the population because most of the bats do not roost in the forest, and bats forage primarily in the brush-dominated areas. A large fire that would consume extensive foraging areas could adversely impact western Townsend's big-eared bats, but the sparsely-vegetated forested stands and brush in most of the Project area are unlikely to sustain a large fire and would thus be unlikely to occur. Changes in habitat resulting from insects, disease, and fire are unpredictable, and the amount of habitat that could be impacted is unpredictable as well. Therefore, there could be no measurable impact as a result of implementing this alternative.

### *Cumulative Impacts*

A reasonable cumulative impacts area includes lands within 15 miles of the Project. This distance is used because Townsend's big-eared bats have been recorded to travel up to this distance to forage in central Oregon, forested lava flows.<sup>38</sup>

### **Alternatives 1, 2, and 3**

Other projects that have occurred within the cumulative impacts boundary are unlikely to have negatively impacted western Townsend's big-eared bats or their habitat. Other projects have occurred in timbered stands that are not typical big-eared bat habitat. Deer hunting and firewood cutting are the primary non-commercial activities occurring in the area and are unlikely to impact big-eared bats because those activities take place in more forested areas. The Modoc Scenic Byway forms the western boundary of the Project area, crosses some suitable big-eared bat habitat, and has heavy recreational travel during the summer, but it is unlikely to adversely impact big-eared bats due to the small impact area.

Fires may have altered some stands and may have varying impacts on roost trees, either destroying them or creating them. Fire may also alter foraging habitat, particularly if open, brush-dominated areas burn. No recent fires of a magnitude that could adversely impact big-eared bat habitat have occurred.

### **Alternative 4**

Since there could be no direct or indirect impacts from implementing this alternative, there could be no cumulative impacts.

## **Determinations**

### **Alternatives 1, 2, and 3**

It is my determination that Alternatives 1, 2, and 3 May Impact Individuals or Habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

### **Alternative 4**

It is my determination that Alternative 4 could not impact Townsend's big-eared bats.

Rationale for determination

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<sup>38</sup> NatureServe 2007.

- Stand treatments would not quantifiably impact primary western Townsend's big-eared bat foraging habitat.
- Occasional individual bats that roost in snags could be impacted, but these would be few in relation to the local colonies that roost in the abundant caves. The colonies and populations would not be quantifiably impacted.
- Known roost sites (caves and old buildings) would be protected from disturbance by a 250-foot buffer.
- Alternative 4 could not impact Townsend's big-eared bats.

### *Pacific Fisher*

The Pacific fisher is a medium-sized member of the weasel family. The US Fish and Wildlife Service described the Pacific fisher as a distinct population segment in 2004.<sup>39</sup> This population once ranged from the southern Sierra Nevada Mountains to the Cascades and north into Canada where the principal range of this species describes an arc across sub-boreal Canada and the northern US. Primary habitat in the western US is located in low- to mid-elevation valleys, heavy canopy cover of conifer or mixed conifer and hardwood with significant levels of large, woody debris.<sup>40</sup> Of particular importance to fisher is riparian habitat for the structural features and productivity they offer.<sup>41</sup> Trapping and loss of habitat are the likely causes of the population decline, and it is suspected that habitat loss has prevented population recovery.<sup>42</sup>

Habitat use is thought to be related more to forest structure than to forest vegetation type.<sup>43</sup> Preferred habitat is typically mature and old-growth forests with high canopy closure, large trees and snags, large woody debris, large hardwoods, multiple canopy layers, and avoidance of areas lacking overhead canopy cover.<sup>44</sup> Fishers will utilize younger forests in moist or coastal climates where down wood exists and more importantly, where prey can be found and easily captured.<sup>45</sup>

Denning and resting habitat is thought to be a limiting factor in current fisher distribution and habitat use. Rest sites and dens must be numerous and distributed across the landscape in suitable habitat.<sup>46</sup> These sites typically have the largest available live trees and snags, dense canopy cover, multi-storied stands, and are typically in oaks and Douglas-fir.<sup>47</sup>

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<sup>39</sup> Ibid.

<sup>40</sup> U.S. Department of the Interior Fish and Wildlife Service. 2004. Federal Register. Endangered and Threatened Wildlife and Plants; 12-month Finding for a Petition To List the West Coast Distinct Population Segment of the Fisher (*Martes pennanti*); Proposed Rule. USDI Fish and Wildlife Service. Sacramento, California.

<sup>41</sup> Ibid.

<sup>42</sup> Ibid; Natureserve 2007.

<sup>43</sup> USDI Fish and Wildlife Service 2004.

<sup>44</sup> Ibid.

<sup>45</sup> Ibid.

<sup>46</sup> Ibid.

<sup>47</sup> Ibid.

Fisher studies have not occurred near the project area so home range sizes are taken from other California studies. Powell and Zielinski<sup>48</sup> report home range sizes in northern California of 2,471-8,648 acres for males and 1,037-1,680 acres for females.

Important factors addressed by the US Fish and Wildlife Service that could relate to this action are timber sales and fuels treatments, habitat fragmentation, and roads.<sup>49</sup> Timber sales and fuels treatments have changed and can change habitat by removing resting and denning trees, eliminating cover or reducing canopy density, removing down wood and brush, and reducing structural complexity of forests.<sup>50</sup> Habitat fragmentation can occur from these activities through the loss of structure and down wood, features important for both the fisher and its prey, and through decreases in canopy density that make movement difficult.<sup>51</sup> Roads can fragment habitat as well by creating disturbance and making possible further intrusion into contiguous blocks of habitat.<sup>52</sup>

### Existing Condition

Habitat for fishers is limited in and near the Project area for several reasons. First, the known current extent of the fisher in northern California lies primarily to the west and south of the Project area; records of fisher near the area are rare and anecdotal. Surveys by North State resources in 2002 found no fishers east of Mt. Shasta on the Management Unit.<sup>53</sup> Second, habitat for the fisher was historically limited by vegetation in the project area by high densities of brush and low-density pine, and the late-successional, dense forests were restricted to high elevations outside fisher habitat preferences. Third, preferred resting and denning trees are large oaks (*Quercus spp.*) and Douglas-fir (*Pseudotsuga menziesii*), both of which are uncommon in the project area, in particular as large, old trees. Lastly, suitable forested stands in and near most of the project area are isolated islands separated by much barren rock and shrubs on the lava flows and unsuitable vegetation in extensive, early successional pine stands. There exists little in the way of heavily-timbered, dense riparian corridors connecting suitable habitat.<sup>54</sup>

Suitable habitat does not exist in patches large enough to support a whole or partial fisher home range and nearby patches of suitable habitat are not connected by corridors of suitable habitat. Although plantations may provide foraging habitat, they do not contain the structure, canopy closure, down wood, and shrub component to be suitable resting habitat.

### Determination

It is my determination that any of the proposed alternatives would have No Impact on the Pacific fisher or its habitat.

Rationale for determination:

- Primary fisher range in northern California lies to the west and south of the project area.

<sup>48</sup> Ruggiero, L. F., K. B. Aubry, et al. 2004. The Scientific Basis for Conserving Forest Carnivores American Marten, Fisher, Lynx, and Wolverine in the Western United States. USDA Forest Service Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado.

<sup>49</sup> USDI Fish and Wildlife Service 2004

<sup>50</sup> Ibid.

<sup>51</sup> Ibid.

<sup>52</sup> Ibid.

<sup>53</sup> Derby, D., Wildlife Biologist, Shasta-Trinity National Forest. 2008. Personal communication.

<sup>54</sup> USDA Forest Service 2003.

- The forested stands in the project area are unsuitable as fisher habitat due to the dry climate, lack of dense riparian corridors, lack of suitable denning and resting trees and snags.
- Suitably structured stands of trees are naturally fragmented and separated by unsuitable travel habitat. Therefore, these stands cannot contribute to a viable home range.

### *American Marten*

The American marten is a medium-sized member of the weasel family, slightly smaller than the fisher. The mountainous forests of the Rocky Mountains, Sierra Nevada, and Coast Ranges covers the distribution<sup>55</sup> of the marten in the western US. General habitat preferences in the lower fort-eight United States are conifer forests that offer a dense canopy, down woody debris, and broadly riparian or mesic habitat.<sup>56</sup> Of particular importance to marten is the quantity of down woody debris on the forest floor as it provides protection from predators, access to the under-snow environment for hunting and resting, and thermal protection from heat and cold.<sup>57</sup> Use of open habitat types is restricted to those that offer some overhead cover<sup>58</sup>. Average home ranges are usually less than 2,470 acres,<sup>59</sup> but are likely larger in the project area and general vicinity because the climate is very dry, riparian habitat is generally absent, and stands of mature trees are naturally fragmented, all of which contribute to making this area marginal habitat.

The Shasta-Trinity National Forest Land and Resource Management Plan expects the habitat for furbearers will be provided through management of late-successional habitat and riparian reserves and dead/down and green tree retention with snag management in Matrix lands.

### Existing Condition

Locally, the best habitat is found in mature forest types above 4,000 feet in elevation with riparian corridors, and more specifically in locales west and south of the project area.<sup>60</sup> Fire exclusion has probably increased available habitat; however, that condition is undesirable due to insect, disease, and fire risk conditions.

The isolated stands could not contribute enough contiguous acres to form single home ranges for marten in the project area. In order for there to be a single marten home range, habitat outside the Project boundary would have to be included. The best available habitat for marten coincides with the mid- and late-successional dense stands that are northern spotted owl and goshawk habitat (see Figure 3 above). Thus, there are about 13,544 acres of marten habitat in the Project area, based on structure alone. Note again there is a lack of riparian habitat in this area. These factors lead to the habitat being marginal. See Figure 11 for the distribution of marten habitat, the proposed treatment areas, and the historic treatment area in the project area.

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<sup>55</sup> NatureServe 2007.

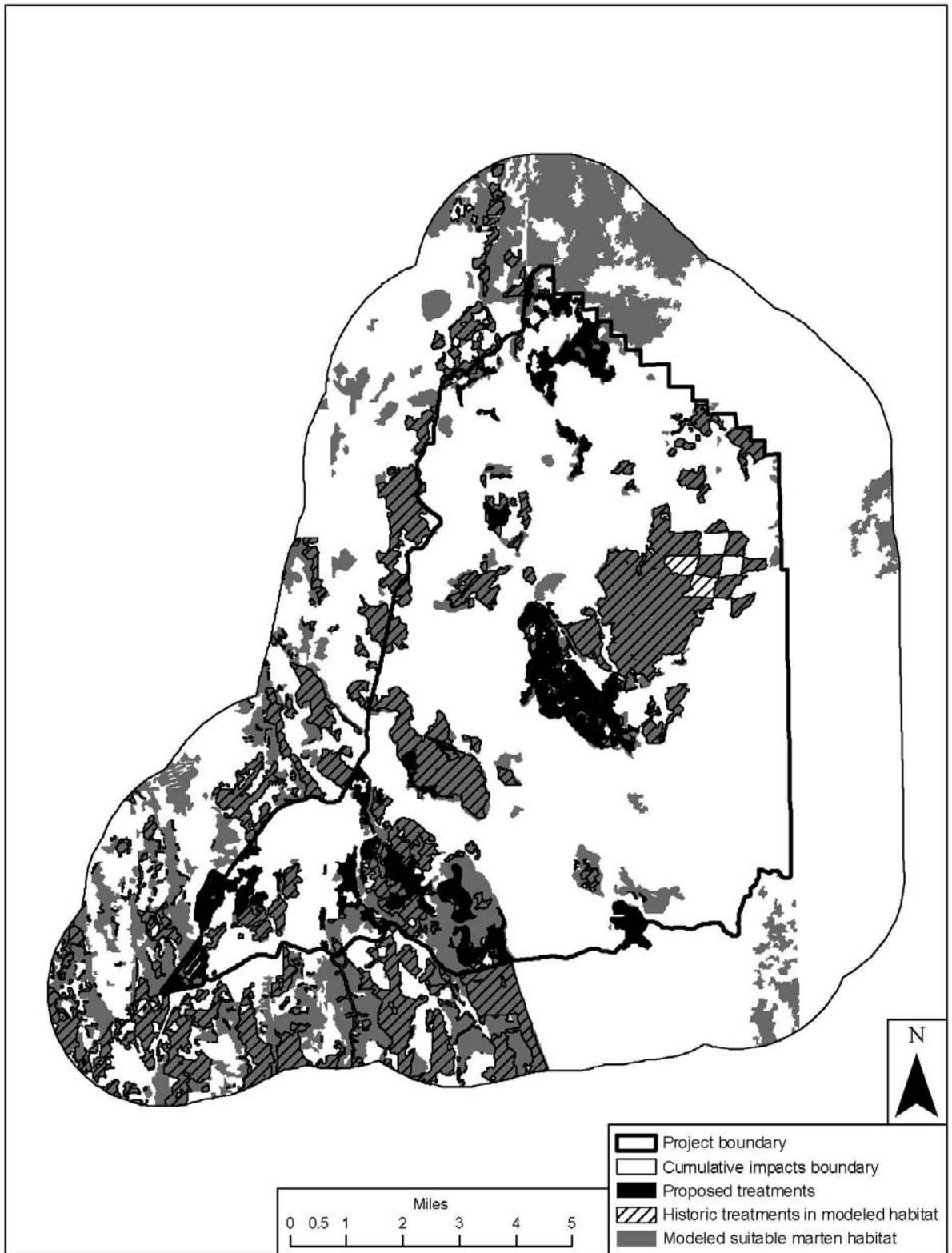
<sup>56</sup> Powell, R., S. W. Buskirk, et al. 2003. Fisher and Marten (*Martes pennanti* and *Martes americana*). Wild Mammals of North America - Biology, Management, and Conservation. G. Feldhamer, B. Thompson and J. Chapman. Baltimore, Maryland and London, England, Johns Hopkins University Press: Chapter 29, Ruggiero, Aubry, et al.

<sup>57</sup> Ruggiero, Aubry, et al. 2004.

<sup>58</sup> Ibid.

<sup>59</sup> NatureServe 2007.

<sup>60</sup> USDA Forest Service 2003.



**Figure 11. Marten habitat, proposed treatment areas, and historic treatments in the porcupine project area**

Modeling for American marten habitat using the Forest’s vegetation database indicates there are about 13,544 acres of suitable habitat within the Project boundary (see Table 19 below). Strata codes selected to model marten habitat include stands 3N and larger and denser, lodgepole pine stands, and mature plantations.

One known sighting from 1990 exists, from the northern corner of the Project, near the LSR. North State Resources furbearer surveys in 2002 identified a marten four miles northwest of Six Shooter Butte.<sup>61</sup>

**Table 19. American marten habitat in the Porcupine project boundary and impacts to marten habitat by alternative**

Marten Habitat in Project Area	Marten Habitat Impacted by Alternative			
	Alt. 1	Alt. 2	Alt. 3	Alt. 4
13,544 Acres	3,275 Acres (24.2%)	3,083 Acres (22.7%)	3,210 Acres (23.7%)	0 Acres (0%)

## Impacts Analysis

### *Environmental Consequences Specific to Alternatives 1, 2, and 3*

#### **Direct and Indirect Impacts**

Direct impacts that could kill or injure martens are unlikely because martens are mobile. Given the probable absence of martens in the Project area, this impact is even more unlikely.

The number of acres of impacted marten habitat varies with each alternative and is displayed in Table 19 above. About 3,275 acres of marten habitat could be impacted by Alternative 1, about 3,083 acres under Alternative 2, and about 3,210 acre under Alternative 3. In general, treatment actions that could impact marten habitat could include reductions in canopy closure, down wood, snags and understory vegetation. Canopy closure retention for other late-successional species would maintain minimum 40 percent canopy closure for martens in impacted stands. Reductions in down wood accumulations and snags may impact the marten the most as it depends on this feature for prey and shelter. By meeting standards and guidelines for woody debris and snag retention, these alternatives would maintain habitat as suitable, even if marginal, because of other reasons already mentioned. Within ten years, shrub and ground cover should return to pre-treatment levels and therefore would provide foraging habitat quality similar to existing conditions.

Over the long-term, up to 100 years post-treatment, thinned stands could be expected to have suitable foraging habitat with larger diameter trees with larger crowns, more and larger snags and down wood, greater canopy closure, and some understory diversity. Furthermore, treatments are expected to maintain habitat for marten for the long-term by reducing insect, disease, and fire threats.

Habitat for marten would continue to be poor due to lack of true riparian areas and dense corridors between suitably-structured, mature mixed conifer stands.

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<sup>61</sup> Derby 2008.

Smoke from fuels treatments could cause martens to avoid the areas where burning is occurring or move away from smoky areas. This impact could be of short duration, several days or less in any single location, and is unlikely to adversely impact martens.

#### *Alternative 4*

There could be no direct impacts as a result of the No Action Alternative as no activities would occur.

Marten habitat, though probably not occupied, would continue to increase in area, based on increasing density of stands, canopy density, down wood, and snags. However, there would still be a lack of riparian vegetation. The stands of trees, although they could be considered suitable habitat, would remain susceptible to stand replacing insect, disease, and fire events, and would in general be outside the normal range of variability. Over time, the stand replacement risks would increase. These potential indirect impacts to marten are immeasurable.

There could be no change to the natural fragmentation of marten habitat.

#### *Cumulative impacts*

A reasonable cumulative impacts area includes those areas of suitable habitat within two miles of the Project boundary. This distance is roughly the diameter of a circular, 2470 acre home range.

Modeled marten habitat in the cumulative impacts boundary covers about 35,656 acres of forested areas like those modeled inside the Project boundary. Given the lack of riparian habitat, most of this could be considered foraging habitat. Like the habitat in the Project boundary, the habitat in the remaining cumulative impacts boundary is naturally fragmented.

#### **Alternatives 1, 2, and 3**

Past projects have impacted about 14,778 acres of marten habitat in the cumulative impacts boundary through timber and salvage sales, plantation management, and thinning operations. There are three ongoing projects that could impact marten: Bear Mountain, Davis, and Powder. During these projects, marten would likely forage elsewhere to avoid disturbance. The treated stands are all expected to remain viable as marten foraging habitat in the long-term as they were managed to retain late-successional habitat where it occurred. These activities, like those proposed for the Porcupine Project, are expected to reduce the risk from stand replacement events such as insect, disease, and fire. Table 20 below displays impacts to marten habitat in the cumulative impacts area.

The Porcupine Project could add cumulatively to those total acres of marten habitat impacted by activities. The Project could maintain habitat for marten throughout most of the stands under the proposed treatments. Therefore, habitat in the cumulative impacts area should be expected to remain stable.

#### **Alternative 4**

Since there could be no direct impacts to marten as a result of implementing this alternative, and because there could be no quantifiable indirect impacts at this time, there can be no cumulative impacts to marten.

**Table 20. Impacts to American marten habitat in the cumulative impacts boundary**

Marten Habitat in the Cumulative Impacts Boundary	Marten Habitat Impacted by Other Actions in the Cumulative Impacts Area	Cumulative Acres of Marten Habitat Impacted by Alternative			
		Alt. 1	Alt. 2	Alt. 3	Alt. 4
35,656 Acres	14,778 Acres (41.4%)	17,828 Acres (50.0%)	17,625 Acres (49.4%)	17,763 Acres (49.8%)	14,778 Acres (41.4%)

**Determinations**

**Alternatives 1, 2, and 3**

It is my determination that Alternatives 1, 2, and 3 May Impact Individuals or Habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Rationale for determination

- Marten are unlikely to inhabit the Project area and evidence is old and anecdotal.
- Marten habitat is poor due to natural fragmentation and lack of riparian corridors within the Project area. Fragmentation and lack of true riparian corridors makes much of the structurally suitable habitat unavailable and contributes to poor dispersal capability.
- Any marten habitat could be retained under guidelines for managing late-successional habitat in Matrix and LSR allocations. About 25 percent or less of the available marten habitat could be impacted under any of the action alternatives.

**Alternative 4**

Alternative 4 could have No Impact on marten.

Rationale for determination

- There could be no direct impacts to marten by implementing this alternative.
- There can be no quantifiable indirect impacts to marten at this time.

***Survey and Manage Snails***

Six survey and manage snail species are to be surveyed for prior to management activities. Habitat for five of these species is does not occur within the project area because there are no limestone outcrops in the watershed (four species) or it does it does not occur in the county (one species). There is marginal habitat potential for one species.

In general, habitat needs for these snails focus on permanent water: permanently damp areas, perennial streams and associated riparian areas, springs, and seeps.<sup>62</sup> Also potentially utilized by the one most likely to occur are conifer or hardwood habitats with woody debris, talus, or caves

<sup>62</sup> Duncan, N., T. Burke, et al. 2003. Survey protocol for Survey and Manage terrestrial mollusk species from the Northwest Forest Plan. USDA Forest Service and USDI Bureau of Land Management. Portland, Oregon. 70 pages.

nearby.<sup>63</sup> The Northwest Forest Plan was designed to manage for these terrestrial snails by maintaining late-successional habitat and was incorporated into the Shasta-Trinity LRMP.

### Existing Condition

The Porcupine watershed and this project area in particular lack surface water. In the project there are five riparian management areas in the southwest corner that were surveyed for these snails. These riparian areas are ephemeral in nature, are grass covered during the summer, and lack of forest cover. Soils dry out quickly after the spring melt. These management areas are buffered by 250 feet on each side of the ephemeral watercourse.

Surveys were conducted for these snails in late 2006 and early 2007. No snails were discovered.

### Impacts Analysis

#### *Environmental Consequences Specific to Alternatives 1, 2, and 3*

Direct impacts to snails are unlikely due to two reasons. One, these snails have not been found in their suitable, though marginal, habitat. Second, proposed almost all activities would remain outside the riparian zones. The only exception to this could be meadow restoration activities. These snails are not likely to present in the dry meadows proposed for restoration.

Indirect impacts could occur due to habitat changes. Proposed treatments include about 10 acres of meadow restoration, 80 acres of thinning, and 30 acres of aspen release in survey and manage habitat. These impacts could be beneficial in the long-term because the meadow and riparian systems could be restored to historic, open conditions typical of their ephemeral nature. Road closures in the meadow would further enhance long-term stability of meadows by maintaining local surface hydrology and preventing channeling of run-off water by rutted roads. Thinning and removal of some trees could reduce the risk of intense, stand replacing fire in these habitat types.

Given the poor habitat and absence of snails, direct impacts are unlikely and indirect impacts are likely to be beneficial to existing habitat, even though the existing habitat is marginal.

#### *Environmental Consequences Specific to Alternative 4*

The no-action alternative could not directly impact these terrestrial snails because no management activities could occur.

Indirect impacts to habitat include further forest encroachment to riparian areas and potential snail habitat. These riparian areas are ephemeral in nature, and are covered in grasses. Further encroachment by trees could eliminate the existing riparian habitat, even further reducing the marginal habitat for these snails.

Reforestation of these meadows and this type of riparian area also increased risk of stand replacement due to fire. A stand replacement fire would certainly kill some snails if they were present; however, given that no snails have been found to date in the project area, there could be no impact. Stand replacing fire would re-initiate seral stage development in the meadow. Because there would be no change to the hydrology or amount of precipitation, the habitat for snails would still be marginal.

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<sup>63</sup> Ibid.

*Cumulative Impacts*

A reasonable cumulative impacts area includes those surveyed riparian areas inside the Project boundary because these animals are limited in their movement to permanently wet areas.

Many projects have occurred in the cumulative impacts boundary, but not in riparian areas. Grazing and roaded recreation have been the primary recent activities in these zones. Grazing no longer occurs and roads associated with the meadows near the riparian areas could provide the most likely source of direct or indirect impacts. Fire exclusion has likely changed the meadows the most.

**Alternatives 1, 2, and 3**

The action alternatives are unlikely to contribute cumulatively to any impacts from other activities. The poor habitat and no presence of these snails suggest that these snails may not have been present in these riparian areas in the past. While restoration of the meadows may contribute to better riparian habitats in the watershed, the type of meadow is not suitable for these snails. There could still be no permanently wet riparian areas.

**Alternative 4**

There could be no direct impacts to snails as a result of implementing this alternative. There could be no measurable indirect impacts to snails at this time due to implementing this alternative.

**Determination**

**Alternatives 1, 2, and 3**

It is my determination that Alternatives 1, 2, and 3 May Impact Individuals or Habitat, but would not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Rationale for determination:

- Species were not located in survey and manage habitat.
- Available survey and manage habitat is poor due to dry climate, poor soils, and lack of perennial water.
- Restoration activities could improve one type of meadow, but not the type on which the snail depends.

**Alternative 4**

It is my determination that Alternative 4 could have No Impact on the survey and manage snails.

Rationale for determination:

- Species were not located in survey and manage habitat.
- No habitat could be changed if the alternative were implemented.

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