United States Department of the Interior

BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT OFFICE
3040 Biddle Road
Medford, Oregon 97504
email address: or110mb@or.blm.gov

IN REPLY REFER TO:
1792(116)
Middle Thompson EA
A6158(LL:jl)

JUN 2 3 2000

Dear Interested Public:

The enclosed *Supplemental Environmental Assessment* (SEA) for Shaded Fuelbreak No. 4 of the Middle Thompson Timber Sale is being advertised in the Medford Mail Tribune for a 30 day public review period.

The primary purpose of a public review is to provide the public with an opportunity to comment on the BLM's determination that there are no significant impacts associated with the proposed action and, therefore, an environmental impact statement is not necessary. The BLM will hold a public meeting to discuss the SEA on July 12 at 7:30 p.m. in the BLM's Medford District Office at 3040 Biddle Road.

We welcome your comments on the content of this document. We are particularly interested in comments that address one or more of the following: (1) new information that would affect the analysis, (2) possible improvements in the analysis; and (3) suggestions for improving or clarifying the proposed management direction. Specific comments are the most useful. Comments, including names and addresses, will be available for public review. Individual respondents may request confidentiality. If you wish to withhold your name and/or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety. This EA is published on the Medford District web site, www.or.blm.gov/Medford/, under "Planning Documents."

All comments should be made in writing and mailed to Lorie List or Bill Yocum, Ashland Resource Area, 3040 Biddle Road, Medford, OR 97504. Any questions should be directed to Lorie or Bill at (541)618-2384.

Sincerely,

Richard J. Drehobl
Field Manager
Ashland Resource Area

Enclosures (as stated)

UNITED STATES

DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

MEDFORD DISTRICT

BUREAU OF LAND MANAGEMENT SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT AVAILABLE

The supplemental environmental assessment for the Middle Thompson Shaded Fuelbreak No. 4 is available for a 30 day public review at the BLM's Medford District office. The review provides the public with an opportunity to comment on the BLM's determination that there are no significant impacts associated with the proposed action, and an environmental impact statement is not necessary.

The proposed action is to complete Shaded Fuelbreak No. 4 of the Middle Thompson Timber Sale and to study the impacts of fuelbreak construction on Siskiyou mountain salamander abundance in the project area. The proposed action affects BLM lands in the Ashland Resource Area.

The supplemental environmental assessment is available at the Medford District Office, 3040 Biddle Road. Written comments should be sent to the Ashland Field Manager at the Medford office. All written submissions in response to this notice will be made available for public inspection, including the submitter name and address, unless the submitter specifically requests confidentiality. All written submissions from business entities and organizations, submitted on official letterheads, will be made available for public inspection in their entirety.

Further information on this proposed project is available at the Medford District Office, 3040 Biddle Road, Medford, Oregon 97504 or by calling Lorie List or Bill Yocum in the Ashland Planning Department at (541) 618-2384.

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT
ASHLAND RESOURCE AREA

Supplemental Environmental Assessment

for

Shaded Fuelbreak Unit No. 4 of the Middle Thompson Timber Sale

EA No. OR-110-96-09S

This Supplemental Environmental Assessment was prepared utilizing a systematic interdisciplinary approach integrating the natural and social sciences and the environmental design arts with planning and decision making.

Richard J. Drehobl
Ashland Field Manager

06-20-00
Date

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ASHLAND RESOURCE AREA
EA COVER SHEET

Project Name and Number: Middle Thompson Shaded Fuelbreak No. 4 OR-110-96-09S

List of Preparers	Title	Responsibility	Initial/Date
Matt Broyles	Wildlife Biologist	Wildlife	for MB 20 JUN 00
Ken Brown	Forester	Logging Systems	
Greg Chandler	Fuels Management Specialist	Fire Management	GC 6-20-00
Ted Hass	Soil Scientist	Soils	
Kenny McDaniel	Forester	Silviculture	KM 6/20/00
Steve Armitage	Forest Manager	Team Lead	SA 6-20-00
Lorie List	Environmental Planner	Coordinating, Writing/Editing, NEPA	LL 6-20-00
Bill Yocum	Planning & Environmental Coordinator	NEPA	WY 6/20/00

ASHLAND RESOURCE AREA
Middle Thompson Shaded Fuelbreak No. 4 OR-110-96-09S

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Supplemental Environmental Assessment
for
Middle Thompson Shaded Fuelbreak No. 4

CHAPTER 1

BACKGROUND

This Supplemental Environmental Assessment (SEA) for the Middle Thompson Shaded Fuelbreak No. 4 on Shaded Fuelbreak Unit No. 4 of the Middle Thompson Timber Sale is required by the "STIPULATION FOR DISMISSAL" (CIVIL No. 99-3042-CO) between HEADWATERS (Plaintiff) and BUREAU OF LAND MANAGEMENT (defendant) signed August 1999. This Environmental Assessment supplements the 1996 Middle Thompson Creek Projects' Environmental Assessment and the subsequent 1997 Amended Environmental Assessment (OR-110-96-09).

In August 1999, the BLM agreed to suspend logging operations in Shaded Fuelbreak Unit No. 4 of the Middle Thompson sale until the provisions listed in the "Stipulations for Dismissal" were met.

The "Stipulations for Dismissal" included the following:

- BLM shall not proceed with the publication of this supplemental EA or the logging of Shaded Fuelbreak Unit No. 4 unless the research proposal has been accepted by the Regional Ecosystem Office (REO) as a research exception to the standards and guidelines of the Northwest Forest Plan Record of Decision (page 3). (*In a letter dated March 22, 2000, REO stated that contingent upon a finding of no significant risk in the NEPA process, "the REO finds no reason to deny the request of a research exemption for study activities that are otherwise inconsistent with the SMS Protection Buffer Standards and Guidelines*. See Appendix A.)

- The BLM will "…prepare for public comment a full supplemental environmental assessment of the proposal to carry out the logging and research project on Shaded Fuelbreak Unit No. 4 of the Middle Thompson timber sale (page 3).

- "The Supplemental EA shall discuss and analyze the justification for Shaded Fuelbreak Unit No. 4 and the impacts of not following the protection measures for the Siskiyou mountain salamanders as defined on Page C-28 of the ROD (page 4).

PURPOSE AND NEED

The interagency *Applegate Adaptive Management Area (AMA) Ecosystem Health Assessment* classified the Middle Thompson Creek project area as having a high fire risk and fire hazard (page 48). This assessment recommends reducing fire risk and hazard at a broad scale, utilizing density management, prescribed fire, manual manipulation of live and dead vegetation, and shaded fuelbreaks (page 70). The *Middle Applegate Watershed Analysis* recommends, as a high priority, the construction of shaded fuelbreaks along main ridge lines in order to reduce the risk of loss from the occurrence of catastrophic wildfire (page 91).

Shaded fuelbreaks have several important functions in a landscape. In the Middle Thompson Creek project, shaded fuelbreaks are strategically located on ridge lines throughout the watershed. The construction of a shaded fuelbreak involves removing dense understory vegetation, commercially thinning the overstory, and leaving most of the larger overstory trees (average diameter of trees left is 24") for shade and habitat protection. The result is a stand with a significantly decreased fire hazard that serves as a relatively safe and efficient place for firefighters to conduct suppression operations. By providing firefighters with a safe base of operations, fuelbreaks increase the probability of successfully suppressing a wildfire. Fuelbreaks can also change the behavior of a wildfire when it enters the zone with reduced fuel levels.[1] In 1996, a discussion of the role of fuelbreaks at the *17th Forest Vegetation Management Conference* concluded,

> "There will always be a role for well-designed fuelbreak systems which provide options for managing entire landscapes, including wildfire buffers, anchor points for prescribed natural fire and management-ignited fire, and protection of special features (such as urban interface developments, seed orchards, or plantations)."[2]

The design and construction of a shaded fuelbreak system with as many contiguous sections as possible was an integral part of the Thompson Creek Project (Middle Thompson, Hinkle Gulch and Lower Thompson Timber Sales).

Shaded fuelbreaks, however, are not considered a stand-alone strategy in fuels reduction. They must be designed in the context of the surrounding landscape. Fuelbreaks should be viewed as a set of strategically located entries into the landscape that provide protection against fires while long-term, area-wide treatments are implemented.[3] The primary fire management objective for the

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[1] Agee, J. et al. 2000. The use of Shaded Fuelbreaks in Landscape Fire Management. Forest Ecology and Management. 127: 55-66.

[2] Omi, P.N. 1996. The Role of Fuelbreaks. Proceedings, 17th Forest Vegetation Management Conference, Redding, California.

[3] Agee, J. et al.

Middle Thompson Creek project was to promote long-term resistance to stand replacement wildfires through the reduction of hazardous fuels. Achieving this objective required a landscape-level approach to fuels treatment. The highest priority was given to areas classified as moderate to high hazard that were either adjacent to private property or in the upper 1/3 of the slopes (Shaded Fuelbreak No. 4).

Three fuel management strategies were used in this project. The first strategy, density management, reduced the aerial component of fuels. The second strategy reduced ladder and surface fuels on commercial and non-commercial timber lands throughout the entire project area. The third strategy was the development of a shaded fuelbreak system along the major ridge lines delineating the watershed boundary. A watershed is most effectively compartmentalized through the establishment of contiguous areas where fuel hazard has been reduced. This approach helps reduce the potential size of a wildfire. Shaded Fuelbreak No. 4 is part of the shaded fuelbreak system designed for the eastern ridge line in the Middle Thompson Creek project. Fuelbreak No. 4 connects the Lower Thompson Creek fuelbreak system with the previously burned Ninemile Creek area (**See Image 1**).

During the design of the Middle Thompson Timber Sale, Ashland Resource Area scientists identified Siskiyou mountain salamander (SMS) habitat in, and adjacent to, proposed Shaded Fuelbreak No.4. According to the Standards and Guidelines of the Northwest Forest Plan Record of Decision (NWFP ROD), the following provisions apply:

- " All populations (SMS) must be protected by delineating an occupied site and avoiding disturbance of talus throughout the site…"

- "…a buffer of at least the height of one site-potential tree or 100 feet horizontal distance, whichever is greater, surrounding the site, must be retained around the outer periphery of known sites."

- " Overstory trees must not be removed within the boundary of this buffer" (NWFP ROD, C-28)."

However, strict adherence to these standards and guidelines would further disrupt the integrity of the shaded fuelbreak system, which is designed to protect habitat by preventing and/or containing catastrophic wildfire.

The NWFP ROD emphasizes using AMAs, such as the Middle Applegate Watershed, for research into the role and effects of fire management on ecosystem functions (ROD D-8). The ROD states:

> "The Adaptive Management Areas have scientific and technical innovation and

experimentation as objectives. The guiding principle is to allow freedom in forest management and approaches to encourage innovation in achieving the goals of these standards and guidelines" (ROD D-3).

The BLM proposes to study the impacts of fuelbreak construction on SMS abundance by completing Shaded Fuelbreak No. 4 of the Middle Thompson Timber Sale. The proposed study would be conducted under a Research Exception to the Northwest Forest Plan's Standards and Guidelines, subject to approval by the Regional Ecosystem Office. The results of this study would provide the BLM with a better understanding of the impact of fuelbreak construction on SMS populations. The study would also document changes in short and long term microclimate and vegetation structure in the treated area. The BLM would use this information when planning future stand treatments.

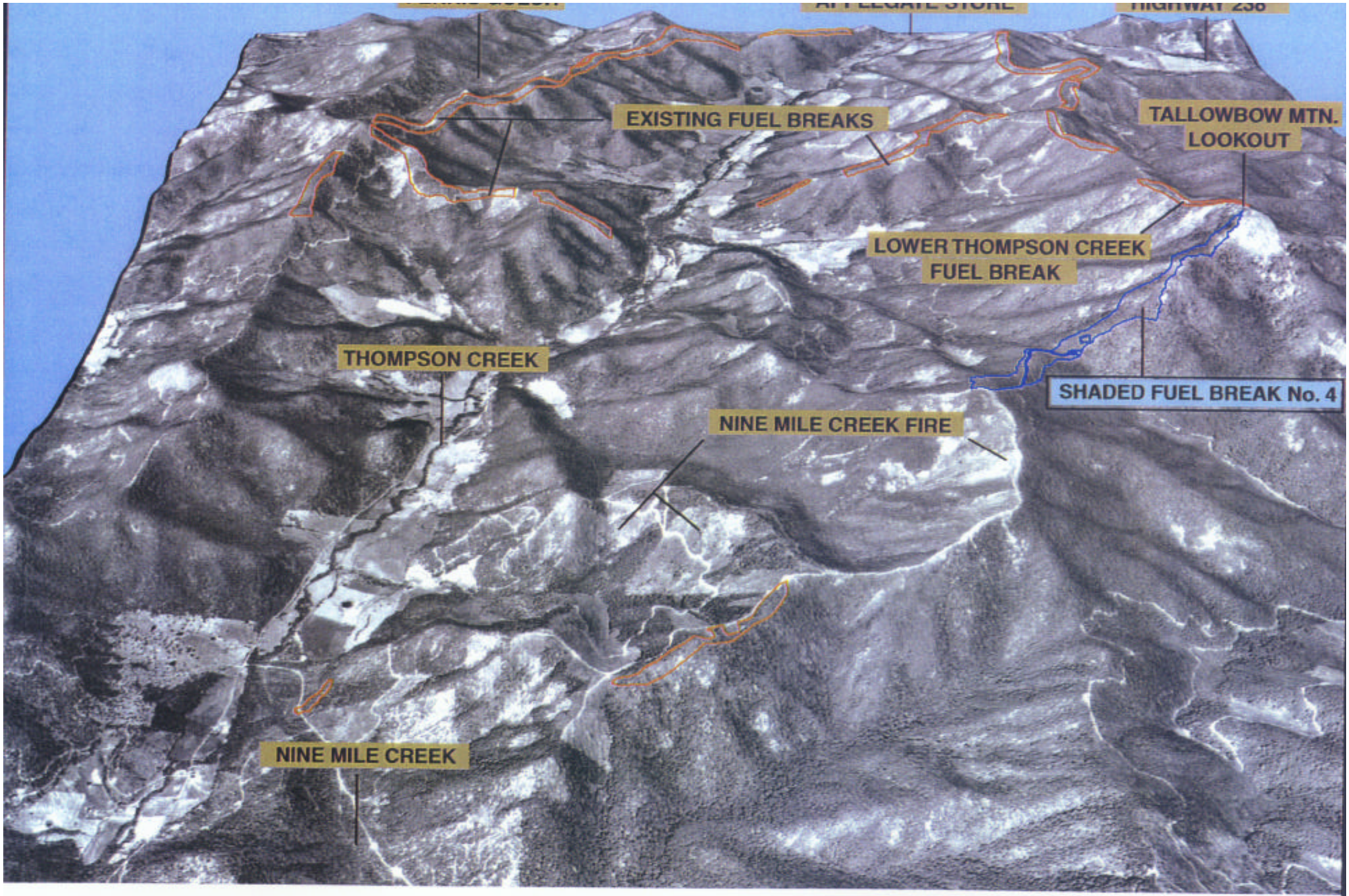
The objectives of this project are to:

- Promote long term resistance of the area to stand replacement wildfires by reducing fuel hazard through the completion of a planned system of shaded fuelbreaks in the Thompson Creek Watershed.

- Learn how to incorporate mitigating measures for the SMS in the design of shaded fuelbreaks and other stand treatments in a way that minimizes the impact on SMS populations, thus reconciling the sometimes conflicting NWFP ROD's objectives of reducing fire risk and protecting SMS populations. The resulting knowledge will be used to design management activities that protect SMS habitat in the long term.

RELATIONSHIP TO STATUTES, REGULATIONS, AND OTHER PLANS

The proposed action and alternatives are in conformance with the direction given for the management of public lands in the Medford District by the Oregon and California Lands Act of 1937 (O&C Act) and the Federal Land Policy and Management Act of 1976 (FLPMA). alternatives. This document supplements the Middle Thompson EA (OR 110-96-09).



Thompson Creek Fuelbreak System

N ↑

IMAGE 1

DECISIONS TO BE MADE ON THIS ANALYSIS

The Ashland Resource Area Field Manager must decide:

- Whether or not the impacts of the proposed action are significant to the human environment beyond those impacts addressed in previous NEPA documents. (If the impacts are not significant, then a Finding of No Significant Impact (FONSI) can be issued and a decision can be implemented. If any impacts are determined to be significant to the human environment, then an Environmental Impact Statement must be prepared before the manager makes a decision.)

- Whether to implement the proposed action alternative or defer to the no action alternative.

RELEVANT ISSUES

The original Middle Thompson EA previously identified and analyzed many relevant issues that apply to this SEA. During the scoping process for this SEA, the Ashland Resource Area mailed a letter to all individuals and organizations on the Middle Thompson mailing list requesting the identification of issues relevant to this EA. Issues relevant to the analysis in this document are listed below:

- The effectiveness of Shaded Fuelbreak No. 4 as a tool to provide firefighters a safe and efficient place to conduct wildfire suppression operations and increase the probability of successfully attacking a wildfire.

- The impact of not following the SMS protection measures as outlined in the NWFP ROD, including the removal of overstory trees within occupied salamander habitat and habitat buffers.

- The impact to SMS habitat adjacent to the project.

- The practicality of designing a shaded fuelbreak with measures that mitigate the impact to the SMS population and maintain the integrity of the project.

- The consequences of not taking proactive measures to protect the landscape from wildfire.

- The importance of Siskiyou mountain salamander habitat in the Applegate Adaptive Management Area to the persistence of the species.

ISSUES CONSIDERED BUT NOT ANALYZED IN DETAIL

The following issues were identified during the scoping process, but were not considered relevant to this analysis. These issues include those that have already been analyzed in a previous and related NEPA document (i.e. The Middle Thompson EA (OR 110-96-09)), or issues that go beyond the scope of this EA and are not relevant to the decision maker.

- The economic impact to the purchaser of the sale. *This is a contractual issue and is covered in the contract between BLM and the purchaser.*
- The effects of prescribed burning on the health of local residents. *Effects on air quality are analyzed in the Medford District's Resource Management Plan and programmatic EA for prescribed burning.*
- The effects of prescribed burning on survey and manage species such as molluscs. *There are no known survey and manage mollusc sites in Shaded Fuelbreak No. 4. Surveys were not required at the time of the Middle Thompson Amended Decision.*
- The potential for controlled prescribed fire to become uncontrollable. *Prescribed burning was analyzed in the original Middle Thompson EA.*
- *The effect of the proposed project on wildlife travel corridors.* The project design features outlined in the analysis of this project would help mitigate the impacts to wildlife species that use this ridge for travel.

CHAPTER 2
Alternatives

INTRODUCTION
This chapter describes the no action and proposed action alternatives. This chapter also outlines specific project mitigation features that are an essential part of the project design.

The Ashland Resource Area has developed a proposed action designed to meet the project objectives outlined in the Middle Applegate Watershed Analysis (pages 91-93) and in accordance with the best management practices as outlined in the Medford District RMP (pages 149-177).

NO ACTION ALTERNATIVE
The no action alternative would reverse the Amended Decision Record of the Middle Thompson EA (1/31/97). Under this alternative, the BLM would not implement Shaded Fuelbreak No.4 and no treatment would take place in the area. Shaded Fuelbreak No.4 was originally purchased by Boise Cascade Corporation as part of the Middle Thompson timber sale. Implementation of this alternative would require BLM to buy back the sold timber from Boise Cascade at current market value.

PROPOSED ACTION ALTERNATIVE
This alternative would implement the Amended Decision Record for the Middle Thompson Creek EA (OR110-96-09), which added Shaded Fuelbreak No. 4 to the Middle Thompson timber sale. Shaded Fuelbreak No. 4 transects Siskiyou mountain salamander (SMS) habitat. The proposed action would be implemented in conjunction with the SMS Study (see Appendix B). The study would investigate the effects of a shaded fuelbreak on the SMS population.

This alternative includes Project Design Features (PDFs) developed to mitigate or reduce anticipated adverse environmental impacts that might result from implementation of the proposed action (**See Image 2**). All PDFs listed in the original Middle Thompson EA (with the exception of protection buffers for SMS) would apply. The Amended EA of Middle Thompson Creek included the following PDFs. The original text appears in bold. Additional clarification is provided in italics.

- **"A higher level of canopy will be retained in the portions of the fuelbreak transecting the habitat areas than prescribed elsewhere. An average of 31 of the larger conifers will be retained rather than the otherwise 16 to 25."**

- **"…very little potential salamander habitat is within the shaded fuelbreak and the quality of the habitat varies significantly. Thus, in areas that were identified as most likely suitable, additional large trees will be retained."** *The use of the word potential is*

incorrect. All suitable salamander habitat in the shaded fuelbreak is assumed to be occupied as per the protocol definition of "occupied." The areas referred to as "most likely suitable" are those areas with prominent rocky outcroppings. These are the areas where additional large trees would be retained.

- **"Hardwood species greater than 15 ft. in height will be retained to increase conifer canopy shade."** *The retention of hardwood species greater than 15 ft. in height would increase the total amount of canopy shade.*

- **"The residual canopy closure is expected to exceed 40% throughout the potential habitat area fuelbreak and higher in areas where additional trees are reserved."** *Canopy closure throughout the entire shaded fuelbreak will not fall below 40%, and would be higher in areas where additional trees are reserved.*

- **"Harvesting within the fuelbreaks will be limited to June 1 through September 30, when the salamanders have retreated deep into the talus substrate."**

- **"Potential habitat areas will be yarded by helicopter."** *Yarding is the removal of commercial timber from the project site. The entire project area would be yarded by helicopter.*

- **"Additional coarse wood will be retained on talus."** *This PDF will not be implemented. Although many salamander species require coarse woody debris, the SMS does not. Retention of coarse woody debris might negatively impact the population by increasing the fire hazard.*

- **"No burning of residual material will occur in the talus areas.**" *In this case, talus refers only to prominent rocky outcroppings. No handpiling of slash or burning of hand piles would occur in these areas.*

- **"Numerous additional mitigating measures will also be implemented."** *These measures include the following: In areas of small diameter pole stands, more trees would be reserved to maintain the desired 40 percent canopy closure. All unmerchantable trees greater than 16 inches in diameter would be reserved. Logging slash between 2 and 8 inches in diameter and greater than 2 feet in length would be hand piled.*

ALTERNATIVES CONSIDERED BUT ELIMINATED

Apply the same prescription used for Shaded Fuelbreaks 1, 2, and 3 in the Middle Thompson Timber sale to Shaded Fuelbreak No. 4. The prescription for Shaded Fuelbreaks 1, 2, and 3 left 16 - 25 trees per acre. This alternative would not meet the objective of reducing potential impacts

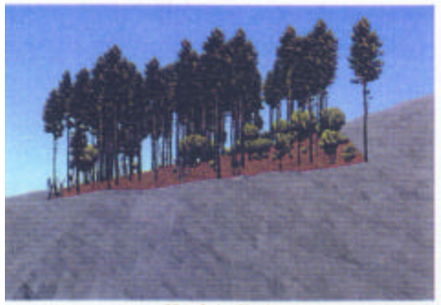
. Existing Conditions

Typical Middle Thompson Creek Shaded Fuel Break Prescriptions

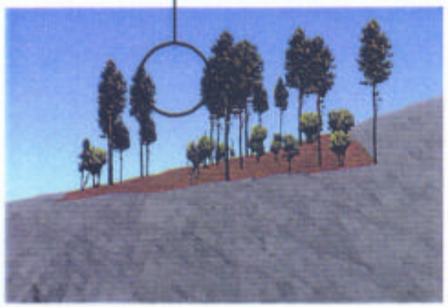
Shaded Fuel Break Number 4 Prescription

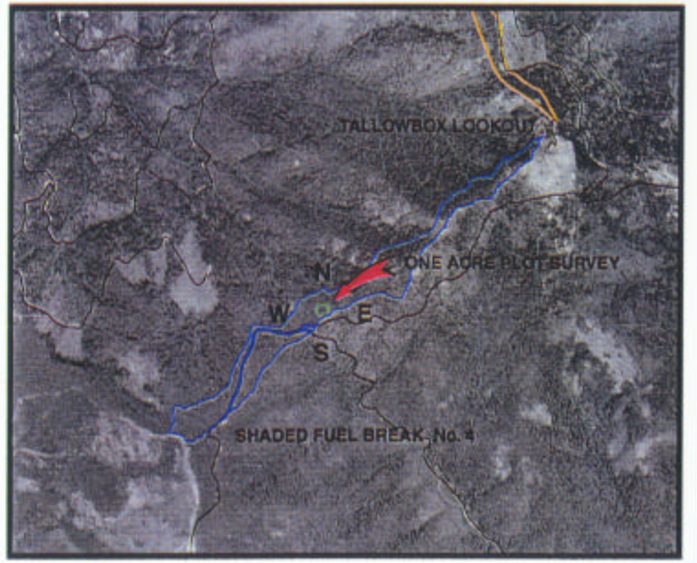
View facing South

View facing East



View facing North





PROJECT DESIGN FEATURES

Canopy closure throughout the entire shaded fuel break will not fall below 40%, and will be higher in areas where additional trees are reserved.

A higher level of canopy will be retained in the portions of the fuel break transecting the habitat areas than prescribed elsewhere. An average of 31 of the larger conifers will be retained rather than the otherwise 16 to 25.

Hardwood species greater than 15 ft. in height will be retained to increase total canopy shade.

Middle Thompson Creek Fuelbreak No. 4

NOTE: THESE IMAGES REPRESENT 3D ILLUSTRATIONS OF STAND CONDITIONS WITHIN A ONE ACRE SURVEYED AREA WITHIN SHADED FUEL BREAK No. 4. THESE CONDITIONS WERE DETERMINED TO BE REPRESENTATIVE OF THE OVERALL STAND CONDITIONS WITHIN THE FUELBREAK. THE PRIMARY PURPOSE OF THESE IMAGES IS TO ILLUSTRATE THE PROJECT DESIGN FEATURES CRITICAL TO THE STUDY. THEY ARE NOT INTENDED TO BE EXACT REPLICATIONS OF EXISTING OR POST-ACTIVITY CONDITIONS.

to the SMS population. It was eliminated from further analysis.

No Commercial Treatment. The ID Team considered an alternative that would have only treated the area with a non-commercial understory treatment. This alternative was eliminated because it would not meet the purpose and need of the proposed action.

CHAPTER 3
Affected Environment

INTRODUCTION

This chapter describes the present condition of the environment within the proposed project area that would be affected by the alternatives. This information provides a general baseline for determining the effects of the alternatives and has been organized around the relevant issues identified during the scoping process. No attempt has been made to describe every detail of every resource within the proposed project area. Enough detail has been given to determine if any of the alternatives would cause significant impacts to the human environment as defined in 40 CFR 1508.27. Surveys were completed for cultural resources, threatened and endangered plants and animals, and special status plants at the time of the original NEPA analysis. All required survey and manage protocols have been completed.

GENERAL DESCRIPTION OF THE PROPOSED PROJECT AREA

The proposed fuelbreak lies along and straddles the top and upper flank of a ridge that runs SW to NE, and climbs to the top of Tallowbox Mountain at its NE end. The northwest face of the ridge is dissected by the upper reaches of several draws which run generally west. These draws have coniferous stands on the cooler north facing aspects and draw bottoms and mostly scrub oak, grass and brush on their south facing aspects. In some parts of the proposed fuelbreak, the coniferous stands have an understory of canyon live oak. The entire ridge is rocky in general and is classified as a transient snow zone in the Middle Applegate Watershed Analysis (p. 11, Map 6).

Forest stand ages range from 80 to 167 years, a result of the many historic forest fires that modified forest stand structure and species composition in this watershed. Douglas-fir is the predominant conifer species with scattered white fire in the overstory. The presence of white fir is attributed to the absence of recent fires. Canyon live oak is the predominant hardwood in the understory with smaller amounts of Pacific madrone and California black oak.

The soil series identified in the proposed project area is Caris-Offenbacher complex. These Caris and Offenbacher soils series are intricately intermingled across the landscape. Most of the time these soils have surface textures of gravelly loam, but in much of the proposed project area, stones overlay the soil surface forming talus. Not all of the talus is easily identified, as it is covered with a layer of needles, leaves, and duff. For the purposes of this project, talus is defined as:

> Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or steep, rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding (Jackson County Soil Survey, SCS, August 1993).

A description of the land areas and resources in the Ashland Resource Area is presented in Chapter 3 of the Final Medford District Resource Management Plan/Environmental Impact Statement (RMP 1995). Also, a detailed description of the Middle Applegate watershed is described in the Middle Applegate Watershed Analysis, completed in August 1995. This document is available at the Ashland Resource Area, Medford District BLM Office and on the Medford BLM web site at <http://www.or.blm.gov/Medford/Planning/Medwatershed.html>.

HIGH FIRE HAZARD AND RISK

Role of Fire and Fire History

Historically, fire played an important role as a key natural disturbance in shaping the landscape within the Applegate Adaptive Management Area (AMA). Before the advent of organized fire suppression, natural fires in the Thompson Creek drainage can be classified as a low-severity fire regime. A low-severity fire regime is characterized by frequent fires of low intensity and short in duration. They are generally small in size and relatively easy to extinguish. This type of fire regime kept the fuel (understory vegetation, woody debris, downed trees) levels light, minimizing the mortality to the overstory when fires occurred.

Fire suppression over the past 100 years has prevented the periodic removal of dead and down fuel and the understory vegetation by wildfire. The area of the proposed shaded Fuelbreak has a dense overstory with ladder fuels in portions of the stand. This creates optimal conditions for the occurrence of crown fires which could result in large stand replacement fires. The increase in fuel levels, along with the development of multi-layered, overstocked stands, has increased the probability of higher intensity stand replacement fires.

Shaded Fuelbreak No. 4 - Existing Conditions

The fire hazard analysis completed for the Middle Thompson Creek project area classified the proposed Shaded Fuelbreak No. 4 and the areas adjacent to it as a moderate to high fire hazard. The existing fuel profile in this area represents a moderate to high resistance to fire control. Fuels reduction work within and adjacent to this habitat would help increase the long-term resistance to stand replacement wildfires within the SMS habitat.

WILDLIFE

SPECIAL STATUS SPECIES

Special Status Species (SSS) include those species that are listed as threatened or endangered, are proposed for listing as threatened or endangered, or are a candidate for listing as threatened or endangered by the U.S. Fish and Wildlife Service, under the auspices of the Endangered Species Act (ESA) of 1973, as amended. Also included are those species listed by the BLM as Sensitive and Assessment species. For this supplemental document, those species identified in the *Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (SEIS) Record of Decision (ROD)* for protection by Protection Buffers and Survey and Manage strategies will also be addressed as SSS. Range-wide inventory and monitoring is needed to better assess habitat needs and population status of many of these species; particularly those that are not presently listed under the auspices of the ESA. Special management may be necessary at the local level to ensure long-term population viability.

Special Status Species in the Proposed Project Area

Siskiyou Mountain Salamander (*Plethodon stormii*)

The Siskiyou mountain salamander (SMS) is presently known to exist in Jackson County, Oregon and northern Siskiyou County, California. In Oregon, most of the reported populations are within the upper Applegate River drainage. The SMS inhabits portions of the proposed fuelbreak site. Suitable habitat for this species is characterized by relatively moist talus or surface rock that is somewhat stabilized and often has a moss covering. Interstitial spaces between the rock pieces allow the salamanders to move up and down within the talus patch. In hot, dry weather the salamanders move away from the surface and go deeper into the talus bed in order to conserve water. This species has no lungs; they breathe through their skin. This type of respiration requires that the skin stay moist. An intact, thick, canopy helps maintain moisture in the talus.

Suitable SMS habitat occurs in the project area where surface rock and conifer stands coexist. Approximately 50 acres of the 93 acre project area is considered suitable habitat for this species. The suitable SMS habitat within the proposed fuelbreak is contiguous with several large blocks of occupied habitat down slope and to the west. Combined, these blocks total over 300 acres. The

proposed fuelbreak intersects only a small portion of these blocks. Following the interagency survey protocol for this species, wildlife biologists determined that all of the suitable habitat in the proposed fuelbreak is occupied habitat.

Pileated Woodpecker (*Dryocopus pileatus*)
The pileated woodpecker is a Bureau assessment species found throughout SW Oregon. Primary habitat is mature/old-growth coniferous forest in the Mixed Conifer and White Fir zones. This species is known to occur in the proposed fuelbreak and may be nesting there.

Red Tree Vole *(Arborimus longicaudus)*
The red tree vole (RTV) is listed as a Survey and Manage strategy two species in the NWFP. This tree- living "mouse" is very closely associated with Douglas-fir, the needles of which it consumes and uses to make nests in trees. No surveys were conducted in the proposed fuelbreak at the time of the original timber sale. Interim guidance and protocol did not require any surveys. In August 1999, Judge William L. Dwyer ruled that the interim guidance was not in compliance with the NWFP. The BLM subsequently conducted red tree vole surveys in Shaded Fuelbreak No. 4 in June 2000. The surveys identified 2 inactive RTV nest trees in the proposed project area.

Threatened and Endangered Species
Northern Spotted Owl *(Strix occidentalis caurina)*
The northern spotted owl is listed as a threatened species under the auspices of the ESA. The conifer stands in the proposed fuelbreak are classified as suitable spotted owl habitat, which means that they are deemed suitable for spotted owl roosting, foraging, and dispersal. These stands may also be suitable for nesting, although their position high on a ridge would make them unusual choices for nest locations. There are four known spotted owl sites within 1.3 miles of the proposed fuelbreak.

CHAPTER 4
Environmental Consequences

INTRODUCTION

This chapter forms the scientific and analytic basis for comparison of alternatives. Discussions include the environmental impacts of the alternatives and any adverse environmental effects which cannot be avoided should the action alternative be implemented. It also identifies and analyzes mitigation measures designed to avoid or reduce projected impacts. The impact analysis addresses direct, indirect, and cumulative impacts on all affected resources of the human environment.

HIGH FIRE HAZARD AND RISK - Direct, Indirect and Cumulative Effects

No Action Alternative

In the development of the Middle Thompson Creek project, the area of Shaded Fuelbreak No. 4 was identified as a high priority for treatment due to the moderate to high hazard fuels and the area's location in the upper 1/3 of the slope. It is difficult to analyze the potential consequences of excluding Shaded Fuelbreak No. 4 from the planned system of shaded fuelbreaks and other fuels treatment in the Thompson Creek Watershed. Computer models simulate fire intensity under differing fuel model scenarios at a large, watershed scale, and would not be able to effectively analyze the impact of changing the fuel profiles in a small area such as Fuelbreak No. 4. However, it is important to note that effectiveness of fuel hazard reduction throughout a watershed increases as more landscape area is treated. The establishment of contiguous areas with reduced fuel hazard increases the ability of firefighters to contain and suppress a wildfire. The exclusion Shaded Fuelbreak No. 4 would leave an additional gap in the planned system of fuelbreaks and other fuel hazard reduction strategies for this portion of the sub-watershed, decreasing the ability of firefighters to suppress and contain a wildfire.

The exclusion of fuels treatment in this area would result in no change to the moderate to high fuel hazard. With continued absence of fire, fuel hazard levels are expected to increase and the area would continue to have a high resistance to fire control in the event of a wildfire. In the event of a wildfire within this area, it would be unsafe to deploy fire suppression forces, thereby increasing the probability of catastrophic damage such as a stand replacement fire.

Under the no-action alternative, the benefits that fuelbreaks provide would also be lost in this area. These benefits include reducing the severity of wildfires within treated areas, providing broad zones for firefighters to conduct suppression operations with greater safety and efficiency, breaking up the continuity of hazardous fuels across the landscape, and providing anchor points to facilitate subsequent prescribed burning. The fire management objective of ensuring long-term resistance to stand replacement wildfires within the salamander habitat would not occur under this alternative.

Proposed Action

Shaded Fuelbreak No. 4 would add an additional 1.6 miles of fuel break along the eastern watershed boudary of the shaded fuelbreak system. The construction of this fuelbreak could increase the ability of firefighters to contain and suppress a wildfire in the Middle Thompson sub-watershed.

Shaded Fuelbreak No. 4 would be the initial entry for fuels management activities within this area of the Middle Thompson Creek sub-watershed. As previously stated, fuelbreaks are not stand alone measures. Increasing the number of acres treated for fuels reduction across a landscape decreases the potential of severe damage from wildfires. Shaded Fuelbreak No. 4 is envisioned as one step toward reducing fuels in the sub-watershed. Fuels downslope from the salamander habitat have been or are currently being treated. Fuels adjacent to the proposed project area on the Star Gulch side will be analyzed for treatment in a future Environmental Assessment. There are currently no plans to treat the fuels immediately adjacent to Shaded Fuelbreak No. 4 due to the presence of salamander habitat. Treatment of adjacent areas in future projects would contribute to the effectiveness of this fuelbreak and would help increase the long-term resistance to stand replacement wildfires within the SMS habitat.

The design criteria for Shaded Fuelbreak No. 4 differs from the other fuelbreaks in the Middle Thompson Creek project due to concerns about SMS and their habitat. However, there are no absolute standards for the width of a fuelbreak or fuel treatments within a fuelbreak. In cases where canopy closure exceeds 40%, as in Shaded Fuelbreak No. 4, surface fuel reduction and understory vegetation clearing should take place over wider areas beyond the boundaries of Shaded Fuel Break No. 4. Future projects would be designed to accomplish this objective.

The construction of this fuelbreak would achieve the following objectives:

- Reduce the severity of wildfires within treated areas.
- Provide broad zones where firefighters can conduct safer and more efficient suppression operations.
- Disrupt the continuity of hazardous fuels across a landscape.
- Provide anchor points to facilitate subsequent prescribed burning.

WILDLIFE - Direct, Indirect and Cumulative Effects
The following section describes the environmental consequences to wildlife of the action and no action alternatives.

No Action Alternative
This alternative would have no immediate effect on the special status species that either occur, or are suspected to occur in the proposed project area. However, fuel accumulation in the area would continue. This fuel buildup could facilitate stand replacement type wildfires. In the event of a stand replacement fire in the project area, many acres of suitable habitat for some or all of these species could be destroyed. The effectiveness of the proposed fuelbreak and the likelihood of a stand replacement event in the area are addressed in the fire/fuel sections of this document.

Proposed Action Alternative
Special Status Species in the Proposed Project Area
Siskiyou Mountain Salamander (*Plethodon stormii*)
There are approximately 50 acres of occupied SMS habitat in the proposed fuelbreak. It is anticipated that fuelbreak construction would reduce salamander numbers within the fuelbreak. The proposed research project would analyze the effects of fuelbreak construction on this species and its habitat.

The Northwest Forest Plan Record of Decision (NWFP ROD) provides specific guidance for the management of this species and occupied habitat. The ROD standards and guidelines require delineation of occupied SMS habitat to avoid disturbance of talus. They also require that occupied habitat be buffered and prohibit the removal of overstory trees within this buffer. The removal of overstory trees is prohibited because canopy closure helps determine the microclimate in and around the rock habitat. Overstory trees provide shade and slow ground level winds. Wind and sun are drying agents, and reduction of canopy closure results in microclimatic changes that are not favorable to the species.

The NWFP ROD also provides for research exceptions to its species protection standards and guidelines. This species is the subject of a research study that would analyze the effects of fuelbreak construction on this species and its habitat. (See Chapter 1 of this document for more information on research exceptions.) Under this alternative, the protection measures recommended by the NWFP ROD would not be implemented. Not implementing ROD protection measures will most likely negatively effect salamanders in the proposed project area and in occupied habitat within several hundred feet. However, several project design features would be incorporated into the action alternative in order to reduce impacts to salamanders in the proposed fuelbreak. These measures would provide a greater degree of canopy closure (shading) than would generally occur in a shaded fuelbreak, and would also reduce disturbance to talus. Logging operations would also be restricted on a seasonal basis to avoid direct impacts as much as

possible. Following is a discussion of the proposed project design features.

- The project design features include the retention of all hardwoods greater than 15 feet tall. Some of these hardwoods may be inadvertently knocked down or incur crown damage as a result of timber falling and yarding operations. Overall, this measure will provide for increased canopy closure and help reduce impacts to the SMS microclimate.

- Additional conifer trees were marked for retention around patches of the best talus habitat. This measure was undertaken to reduce the possibility of damage from timber falling and yarding to the best habitat. This measure would also help avoid logging damage to any hardwoods that may be shading the best pieces of habitat. This measure would also provide a limited amount of conifer canopy closure retention (shading) over the best habitat patches. This shading would be in addition to the increased shading provided by other aspects of Shaded Fuelbreak No. 4.

- Avoidance of piling and burning slash on top of the better talus habitat would reduce heat damage to the habitat.

- Yarding the timber by helicopter instead of by ground based or cable systems would greatly reduce the physical disturbance of the occupied habitat and would reduce the yarding damage to the crowns of residual conifer and hardwood trees as well.

- Previously constructed fuelbreaks on the Thompson Creek drainage reduced canopy closure to 20 or 30 percent. Maintaining a 40 percent canopy closure in Shaded Fuelbreak No. 4 would help reduce the impact to the SMS population in the proposed project area. However, it is expected that residual canopy closure levels below 65-70 percent would still result in reduced SMS numbers on site.

- Restricting harvest operations to the period from June 1 to Sept. 30 would help to reduce direct physical disturbance/crushing impacts to individual salamanders as they are usually deep down in the talus habitat during the hot summer months.

The project design features of the action alternative increase the likelihood of retaining SMSs on site after the construction of Shaded Fuelbreak No. 4. The proposed research project will help evaluate the effectiveness of these measures. In the event that the proposed project completely extirpates this species from the proposed fuelbreak, the effects on the SMS population range-wide would be minimal. Since the NWFP standards and guidelines for this species were written, surveys for the species have approximately tripled the number of known sites, and doubled the

known geographic range (Dave Clayton, personal communication[4]).

Research has shown that microclimatic variables such as wind speed, temperature and relative humidity are affected by edges. For example, in the summer, the portions of forest stands next to open habitats are usually warmer, breezier, and dryer than the interior portions of those stands. Generally, the more distinct the edge between two habitats, the deeper the edge effect on microclimate penetrates into the adjacent forest stand. Microclimatic and habitat effects would extend some distance (possibly several hundred feet) into the occupied habitat immediately west of the proposed fuelbreak. In this case, there will be a fairly distinct edge as canopy closure will be reduced from approximately 84 percent to approximately 40 percent. The impact to occupied SMS habitat adjacent to the proposed fuelbreak would be studied under the proposed study.

The proposed fuelbreak may serve to protect the large blocks of occupied habitat from wildfire under some wildfire situations. See the fuels/fire section of this document for a discussion of the wildfire threat to the large habitat blocks under this alternative.

Pileated Woodpecker (*Dryocopus pileatus*)
Potential nest sites and foraging habitat (large snags) would be reduced on approximately 35-45 acres.

Red Tree Vole *(Arborimus longicaudus)*
Approximately 35-45 acres of suitable habitat would be degraded or lost. The two inactive RTV nests will be protected in accordance with guidance provided by the BLM Oregon State Office (OSO).

Threatened and Endangered Species
Northern Spotted Owl *(Strix occidentalis caurina)*
Approximately 35-45 acres of suitable spotted owl habitat would be lost or degraded immediately and would exist in an unsuitable condition for the foreseeable future. This habitat occurs within the provincial home range radius (1.3 miles) of four known spotted owl sites. The loss of this suitable habitat within the provincial home range radius constitutes Incidental Take of these owl sites. Incidental Take and the loss of suitable spotted owl habitat as a result of this proposed project requires consultation with the U.S. Fish and Wildlife Service (USFWS). This consultation occurred as part of the Medford District programmatic consultation for fiscal year 1997 projects. A Biological Opinion addressing this consultation was issued by the USFWS on Oct. 18 1996. The USFWS concluded that the projects covered in the consultation were not likely to jeopardize the survival of the spotted owl as a species. The stands affected by the project may still function

[4]Dave Clayton has ten years of experience as wildlife biologist for the Applegate Ranger District and is on the Northwest Forest Plan's taxonomic team for amphibians.

as dispersal habitat for this species after treatment, depending on the post-treatment canopy closure.

CHAPTER 5:
List of Agencies and Persons Consulted

SUMMARY OF PUBLIC INVOLVEMENT

During the scoping period, a letter explaining the project and requesting issue identification was mailed to the Middle Thompson Creek Watershed Analysis mailing list and other interested parties. Upon completion of the EA, a legal notification was placed in the Medford Mail Tribune offering a 30-day public review and comment period. A public meeting will be held on July 12 from 5:30 to 7:30 at the Medford District Building located at 3040 Biddle Road. For additional information, please contact Bill Yocum or Lorie List at 541-618-2384.

DISTRIBUTION LIST AND AVAILABILITY ON THE INTERNET

The SEA was distributed to individuals on our updated mailing list from the scoping process. It was also send to the following agencies and organizations.

Applegate River Watershed Council
Association of O&C Counties
Audubon Society
Boise Cascade Corporation
Department of State Forestry
Headwaters
Jackson County Commissioners
Klamath Siskiyou Wildlands Center
Oregon Natural Resources Council
Oregon Department of Fish and Wildlife
Pacific Rivers Council
Rogue Group of Sierra Club
Southern Oregon Timber Industry Association
Southern Oregon University
USFS - Star Ranger District

TRIBES

Cow Creek Band of Umpqua Indians
Confederated Tribes of Grand Ronde
Confederated Tribes of Siletz
Klamath Tribe
Quartz Valley Indian Reservation (Shasta Tribe)
Shasta Nation
Confederated Bands [Shasta]
Shasta Upper Klamath Indians
Confederated Tribes of the Rogue-Table Rock and Associated Tribes

GLOSSARY

Acronyms
EA - Environmental Assessment
ESA - Endangered Species Act
NEPA - National Environmental Policy Act
NWFP ROD - Northwest Forest Plan Record of Decision
PDF - Project Design Feature
RMP - Resource Management Plan
RTV - Red tree vole
SEA - Supplemental Environmental Assessment
SMS - Siskiyou mountain salamander

Aerial Fuels - All live and dead vegetation located in the forest canopy or above the surface fuels. Aerial fuels include tree branches and crowns, snags, moss and high brush.

Fire Risk - Fire risk is defined as the chance of various ignition sources causing a fire, threatening valuable resources, property and life.

Fire Hazard - Fire hazard is the assessment of vegetation by the kind, arrangement, volume, condition, and location that forms a special threat of ignition, spread, and difficulty of control.

Ladder Fuels - Vegetation which provides vertical continuity between the forest floor and forest canopy. Fire is able to carry from surface fuels by convection into the crowns with relative ease.

Occupied habitat - Habitat that has been determined to be occupied by the species in question. This is usually a subset of the suitable habitat present in an analysis area.

Suitable habitat - Habitat that has been identified as being capable of supporting the species in question. This determination is based on qualities of the habitat such as vegetation, aspect, soil characteristics, etc. and is within the known or suspected range of the species in question. Suitable habitat may or may not be occupied or used by the species in question.

Surface Fuels - All materials lying on, or immediately above the ground, including needles or leaves, duff, grass, small dead wood, downed logs, stumps, large limbs, low brush and small trees.

APPENDIX A: Regional Ecosystem Office Letter

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Oregon State Office
P.O. Box 2965
Portland, Oregon 97208

In Reply Refer to:
1736-PFP(931)

Memorandum

To: District Manager, Medford District

From: State Director, Oregon/Washington

Subject: Middle Thompson Creek Siskiyou Mountain Salamander Study Plan

The Regional Ecosystem Office (REO) has reviewed the Siskiyou Mountain Salamander (SMS) Study Plan and concluded that the study plan was did not pose an unacceptable risk to the objectives of the Northwest Forest Plan (NFP) SMS Protection Buffer Standards and Guidelines (S&Gs) that require modification or cancellation of the project.

The Research and Monitoring Group (RMG) findings included:

1. The research is a scientifically sound approach and will be conducted by qualified principal investigators.
2. Concern over limited scope and potential applicability of the results.
3. The proposed research is appropriately located in the Applegate AMA.
4. The materials submitted acknowledge the potential risk from creating the shaded fuel break but does not address the significance of the risks to the SMS.

The RMG recommended, and REO concurred, that several design and evaluations be made and the study re-submitted for a final review.

The REO letter RMG findings are attached.

Enclosure: REO letter

REGIONAL ECOSYSTEM OFFICE

333 SW 1st
P.O. Box 3623
Portland, Oregon 97208-3623
Phone: 503-808-2165 FAX: 503-808-2163

MEMORANDUM

DATE: March 22, 2000

TO: Elaine Zielinski, State Director OR/WA
Bureau of Land Management

FROM: Curtis A. Loop, Acting Executive Director Curtis A. Loop

SUBJECT: Review of BLM Middle Thompson Creek Siskiyou Mountain Salamander Study Plan

A study plan and supporting documents for the referenced research project were submitted to the Regional Ecosystem Office (REO) for review in a letter from the Bureau of Land Management (BLM) dated January 31, 2000. The REO referred the project to the Research and Monitoring Group (RMG) for review. The RMG has completed its review of the Siskiyou Mountain Salamander (SMS) Study Plan and their report is enclosed.

The REO has evaluated the RMG report and concluded that the review did not identify any unacceptable risks to the objectives of the standards and guidelines that would require modification or cancellation of the project. However, the RMG identified several potential modifications for your consideration and evaluation.

The REO understands that steps to conform with the National Environmental Policy Act (NEPA) processes are being completed to further evaluate site-specific aspects and SMS risks. Contingent upon a finding of no significant risk in these NEPA analyses, the REO finds no reason to require cancellation of the project and no reason to deny the request of a research exemption for study activities that are otherwise inconsistent with the SMS Protection Buffer Standards and Guidelines. However, the REO agrees with the RMG that a revised Middle Thompson Creek - Siskiyou Mountain Salamander Study be submitted together with the NEPA analysis for a final review by the RMG and REO regarding the research exemption.

Should you require further assistance on this matter, please feel free to call me (503 808-2166) of Dan McKenzie (503 808-2190).

Enclosure

cc:
REO
IAC
1503/cl

APPENDIX B: Siskiyou Mountain Salamander Study Plan

December 6, 1999

Study Plan to Investigate the Effects of a Shaded Fuel Break on Siskiyou Mountain Salamander *Plethodon stormi* Abundance and Site Microclimate

Lisa M. Ollivier, Dave Clayton, and Hartwell H. Welsh, Jr.

INTRODUCTION

The Siskiyou Mountain salamander (*Plethodon stormi*; PLST) is currently a California State Threatened species and is listed as Sensitive (critical) by the state of Oregon. In 1993, PLST was one of five amphibians identified by the USDA Forest Service in the Record of Decision for the Final Supplemental Environmental Impact Statement for Management of Habitat for Late-successional and Old-growth Forest Related Species Within the Range of the Northern Spotted Owl as a species requiring specific habitat protections (USDA et al. 1994).

The Siskiyou Mountain salamander, a long-lived, endemic salamander, is presently known to exist in Jackson County, Oregon and northern Siskiyou County, California. In Oregon, most of the reported populations are within the upper Applegate River drainage. In California, the species is found from the Seiad Creek drainage east to Elliot and Horse creek drainages. It is has also been recently reported from the Grider Creek, Scott River, Mill, and Thompson Creek drainages.

Historical data on this species lacks information on the range of responses in abundance and distribution to various land management activities. The majority of past studies have focused efforts on areas expected to yield large numbers of salamanders or on areas requiring status reviews prior to ground disturbing projects (Nussbaum et al. 1974, 1975; Cheyne 1973; Kesner 1977; Ellis 1987; Storm 1966). Information is becoming available regarding habitat use across the landscape (L. Ollivier, unpubl. data).

Nussbaum (1974) characterized habitat for PLST as stabilized talus in old-growth forest stands with a northern exposure. Abundances are significantly higher in late-successional forest, capture rates can approach 30 individuals per hour. Canopy closure is typically high on occupied sites, the average canopy of 52 known sites in 1992 was 72% (range 2-100%; D. Clayton, pers. obs.). Catastrophic loss of canopy can extirpate the animals from sites. An occupied site harvested (clear cut) in 1990 was sampled in 1991 and 40 individuals were found, after one year only one individual was found, and since 1993, no PLST have been found at the site (D. Clayton, pers. obs.). While some occupied sites may occur within relatively young forest, canopy closure remains high on these sites. Occupied sites on south and east facing slopes also typically have higher amounts of canopy closure than do north and west facing sites.

Objectives: (1) to investigate the effects of a shaded fuel break on *P. stormi* abundance, and (2) document changes in microclimate and vegetation structure associated with the proposed land management.

BACKGROUND

The Siskiyou Mountain salamander was discovered in 1963 and described in 1965 (Highton and Brame 1965). This species belongs to the salamander Family Plethodontidae. Several species in the genus Plethodon are found in western Washington, Oregon and California. The closest relative to PLST is the Del Norte salamander (*Plethodon elongatus*) (Highton and Brame 1965; Storm 1966; Stebbins 1966,1985; Brodie 1970; Bury 1971, 1973; Nussbaum 1974; Nussbaum et al. 1983; Beatty et al. 1992) which occurs in Humboldt, Del Norte and western Siskiyou counties in California, and in Curry, and Josephine counties in Oregon. Information regarding the range limits of both species are not well defined, nor is the degree of sympatry between the two. Several biologists contend that these species are allopatric, with a disparity between range boundaries of up to 14.5 km (Stebbins 1966, 1985; Brodie 1970, 1971; Nussbaum et al. 1983; Beatty et al. 1992). This is disputed by Bury (1973) and Leonard et al. (1993) as well as recent unpublished data by D. Clayton, all of which state that these species are sympatric along a narrow part of their range in Siskiyou County, California.

Populations of *P. stormi* have been found exclusively in the presence of surface talus (Herrington 1988; Nussbaum 1974; Nussbaum et al. 1983; Stebbins 1966, 1985; Cheyne 1973; Kesner 1977; Ellis 1987). Ellis (1987) states that populations of PLST are associated with talus deposits in inland areas where forest floor litter is thin or absent. Ellis (1987) also states that the talus must be packed loosely enough to accommodate passage by the animals. Habitat for this species is often blanketed in deciduous tree leaf litter and moss (Cheyne 1973).

This species is lungless, all respiration occurs through their moist skin. Feder (1983) describes the physiological limitations of a species like PLST. Lungless salamanders of the temperate zone are limited to microclimates that provide high relative humidity and relatively low temperatures. The skin must be moist and permeable for gas exchange. Plethodontids lose water when outside burrows and retreats, even in moist microhabitats (Feder 1983). To restrict water loss, these species may limit surface activity for foraging and courtship to all but very wet periods. They remain under surface cover objects during the day and are active at night. Usually they lie still with their heads at the entrance to the opening until a prey item is spotted, at which time they dart forward to capture prey such as moths or beetles (Nussbaum et al. 1983).

The Siskiyou Mountain salamander is a short-limbed, long-bodied salamander. Juveniles have a ground color of black and often have an olive-tan dorsal stripe. Adults tend to be purplish-brown with a dense scattering of light flecking on the head, sides and limbs. Adults have 16-18 costal grooves, 3 to 5 ½ costal folds between adpressed limbs (Stebbins 1985). This differs from *P. elongatus* which has 17-20 costal grooves and 5.5 to 8.5 costal folds between adpressed limbs (op. cit.). *P. stormi* ranges in size from 21 mm SVL (0.8 in.; snout-vent length) to 76 mm SVL (3 in.). Adults range up to 140mm total length (5 ½ in.)(op. cit.).

Plethodon stormi is entirely terrestrial. By the time a juvenile is ready to hatch, it has metamorphosed into a fully terrestrial juvenile salamander within the egg. They are able to care for themselves from hatching. No nests of this species have been reported in the literature. It is believed that their timing of laying, clutch size and hatching times are similar to *P. elongatus*. Data suggest females lay eggs every other year in the spring (Nussbaum et al., 1983). They may use nest cavities deep within the talus (moist, protected locations) as do many of the other members of the genus. Females are likely to brood their embryos through the summer in these nest cavities

(Nussbaum et al. 1983). Mature females have 2 to 18 enlarged, white, ovarian eggs (Nussbaum 1974). Mature ova range in diameter from 4.2 to 5.2 mm (Nussbaum et al. 1983). Eggs apparently hatch in the fall, data suggest that hatchlings may remain below the surface of the talus until the following spring (Nussbaum et al. 1983).

Sexual maturity occurs at 5 to 6 years of age, approximately 55 mm SVL (Nussbaum et al. 1983, Brodie 1970). According to Brodie (1970), this species does not exhibit sexual dimorphism.

PLST feed on spiders, pseudoscorpions, mites, ants, collembolans, and beetles. Ants were the most important food in the spring, but were not eaten in the fall; millipedes were not eaten in the spring, but were eaten by large adults in the fall (Nussbaum et al. 1983).

MATERIALS AND METHODS

Site Selection

All sampling will take place within the known range of the species as described by historic accounts (Highton and Brame 1965; Nussbaum 1974, 1975; Storm 1966; Nussbaum et al. 1983; Stebbins 1966, 1985; Herrington 1988; Behler and King 1979; Leonard et al. 1993; Snook 1993; Brodie 1970; Bury 1971, 1973; Beatty et al. 1992; Ellis 1987; Cheyne 1973, Kesner 1977), recent surveys (D. Clayton, unpub. data), and range limit surveys using L. Ollivier and D. Clayton protocol. The study site is located in T39S, R04W, sections 9, 10, 15 and 16. The fuel break is located on the ridge that separates the Upper Thompson Creek drainage from Star Gulch. This area is managed by the Medford District of the Bureau of Land Management. The study area ranges from approximately 975 to 1341 m in elevation (3200 - 4400 feet).

In order to distribute sampling across the area to be managed, sites will be placed approximately 85 meters apart along the entire length of the fuel break, depending on location of suitable substrates (see below). This will yield 30 sites within the 2.57 km (1.6 mile) fuel break. These managed sites will be paired with 30 control plots, placed outside the area to be managed, to the west of the fuel break. These control sites will be located a random distance directly downslope of the managed area (at least 100 m from the edge of the disturbed area). All sites will be located in suitable habitat and will not overlap with adjacent sites.

The next level of sampling involves the placement of sample plots within the above selected stands. Final search area placement is based on documented minimum habitat requirements (minimum essential microhabitat or MEM). The intent is to maximize time, effort, and the usefulness of the data set. This involves removing sites that have little or no possibility of containing detectable PLST because they lack essential microhabitat. This salamander is terrestrial and found only in association with rocky substrates (Nussbaum 1970, 1974; Nussbaum et al. 1983; Stebbins 1966, 1985; Herrington 1988, Brodie 1970, 1971; Leonard et al. 1993). Rocky substrate in this study consists of any rock type (e.g., chert, slate, shale, schist, etc.) with at least some cobble-size pieces (>64mm smallest diameter) on the surface; these are rocks large enough to provide cover to individual PLST. Once it is established by inspection that a stand contains such substrate, a plot center is marked out in the area of greatest rock concentration. As a rule of thumb, the 14 x 14 m (46 x 46 ft) area surrounding the plot center should be approximately 25% covered with this rock. Rock need not be exposed. Rock covered by leaf litter or other organic debris can be easily discerned. We have selected 25% rock cover based on pilot sampling and previous studies that have indicated that >25% rock cover provides sufficient captures in a reasonable

amount of time for robust comparative analysis(Herrington 1988; Nussbaum 1974; *Plethodon elongatus*: Welsh and Lind 1995). While this species may occur in low densities in areas with less rock cover, we are attempting to maximize the search effort by limiting the search to areas most likely to yield captures. The search area of the plot should not be placed in unsearchable areas such as a bedrock outcrop or a group of boulders too large to be moved. Also, the area searched should not contain stream or seep habitat. At no time should the plot center be decided by flipping rocks to establish if and where specimens are located within the stand, this would bias the study and lead to removing the site from consideration.

Areas lacking the appropriate microhabitat will not be sampled. Sites are to be spaced as evenly as possible throughout the fuel break area without overlapping vegetation plots. Vegetation plots will be centered over the search area and plot center. The vegetation plot takes the form of two concentric circles (1/5 ha and 1/10 ha; Fig. 1). Within these two circles a variety of vegetation measures and estimates will be taken to describe the forest structure present at the site (Table 1).

Sampling of all sites will occur prior to any harvest in the fuel break area. This round of sampling will include animal searches and vegetation measurement and installation of microclimate dataloggers. All sites will be searched post harvest for amphibians each year in spring for 5 consecutive years. Vegetation measurement (post harvest) will occur only in the year immediately following harvest and the fifth year at all sites. Data loggers will be maintained throughout the length of the study.

Animal sampling

Area-constrained searches (Welsh 1987, Bury and Corn 1990) will be conducted during daylight hours at each sampling site to determine the number of animals present. Juveniles, subadults and adults of this species are resident in the talus habitat. All age classes will be collected and the combined captures will be used in analyses. This approach requires a thorough search of 196 m^2 sample area by one or more workers. Each site is systematically searched with all cover objects turned, and finer substrates carefully hand sifted, down to 15 cm unless an animal is seen escaping to deeper within the substrate. Escaping animals can be pursued up to 15 cm more in depth. As mentioned above, this species is active on the surface for limited periods of the year (spring = March and April; Sometimes in fall = September to early November). To insure that sampling coincides with the spring surface activity, certain climatic parameters must fall within preestablished limits. These limits are based on published data on *P. stormi* (Beatty et al. 1992; Leonard et al. 1993; Nussbaum et al. 1983; Nussbaum 1974) and *P. elongatus* (Welsh and Lind 1995; Beatty et al. 1992; Nussbaum et al. 1983; Leonard et al. 1993; Welsh and Lind 1992; D. Clayton, pers. obs.; L. Ollivier, pers. obs.). The requirements for climate are: (1) sampling for animals may only occur during the appropriate months of the year (spring), (2) the relative humidity of the site must be a minimum of 65%, (3) air temperature must fall between 4 and 20 °C, (4) the soil temperature must fall between 3.5 and 18 °C, and (5) the soil relative humidity must be a minimum of 5%. Hand sampling is employed for searching, no potato rakes are to be used in a search.

Measuring Biotic and Abiotic Parameters

Habitat variables were selected for measurement using three guiding criteria: (1) parameters that reflect structural, compositional, and microclimatic aspects of the forest environment relevant

to the Siskiyou Mountain salamander or the Del Norte salamander as indicated by previous research (Ollivier et al. unpubl. data; Brodie 1970, 1971; Bury 1973; Nussbaum 1974, 1975; Nussbaum et al. 1983; Stebbins 1966,1985; Herrington 1988; Welsh and Lind 1995); (2) parameters that represented changes in structure and composition of the forest resulting from common management practices such as timber harvesting and reforestation, or natural successional events such as fire, or landslide; and (3) parameters that incorporated aspects of the forest environment reflecting two scales of spatial organization: macrohabitat, and microhabitat.

Microclimate monitoring will occur year round using remote dataloggers (Onset Hobo dataloggers). These devices will be located at every other site and will record air temperature and relative humidity throughout the year.

Measurements of forest structure (macrohabitat scale), and microhabitat variables, will result in approximately 30-40 continuous independent variables and one continuous dependent variable (PLST density). Methods for measuring these variables include (Fig. 1; Welsh and Lind 1995): (1) measurements of general site characteristics with instruments and from topographic maps; (2) visual estimates of cover within the 1/10 ha. circle; (3) five 10 m transects for ground and understory vegetation cover; (4) tree counts and forest age estimates in 1/10 and 1/5 ha. circles centered on the sample site; (5) point estimates of soil and litter characteristics (average of 5 measurements); and (6) estimates of sampling area substrate composition and number of interstitial spaces. Substrate composition will be characterized as a percent visual estimate of the search area in nine categories. A subset of the variables listed in Table 1 will be selected based on analysis results from the habitat associations analysis currently in progress (L. Ollivier). Stand microclimate and variables useful in forest structure description will be measured in addition to those found to describe habitat for the species in the habitat associations analysis.

Detectability

This species spends over 3/4 of the year under the surface in talus deposits. Sampling times for animal sampling have been restricted to periods when the microclimatic minimums at the surface for this species are met to increase the opportunity of capture success. It is possible that some of the habitat that will be sampled yield a fewer number of detections than others merely due to structure. Talus with large interstitial spaces and little filler in the spaces may make captures more difficult. Detections in this type of habitat are possible with well trained field crews, escaping individuals are still able to be counted, they are not available to be measured. Variability in catchability should not have undue influence on the sample if it is large enough, it is representative of a portion of the gradient for attributes being measured.

Statistical Analyses

The original study plan involved the monitoring of approximately 5-7 sites inside the fuel break and a similar number of plots in the downslope, unharvested habitat. The objective of the study at that time was to determine if the creation of a shaded fuel break caused extirpation of Siskiyou Mountains salamanders at the site. The original study involved the measurement of several vegetative parameters that would aid in the description of the vegetative change associated with the fuel break harvest, monitoring the microclimate with data loggers, and sampling of the amphibians each spring for 1 season before harvest and 3-5 years post-harvest. The objectives were altered in 1999 following an appeal of the timber harvest and subsequent negotiations. The study

objective is now to detect a significant change in PLST numbers, this changed the sample size and the types of variables we will track through time. There are currently three plots in the fuel break area and ten in the control area that have been sampled for vegetation, amphibians and microclimate. Additional sites will be added in the spring of 2000 to bring the number of sites up to 30 inside and 30 outside the fuel break. This increase in sample size is necessary to be able to be confident that a change in animal numbers can be detected if one occurs (see below for calculation).

We will perform preliminary descriptive analyses to review the distributions of the 30 to 40 habitat variables selected for monitoring through time in addition to the dependent variable. Histograms, normal score plots, and measures of skewness and kurtosis (SAS 1990), will be used to assess the normality of distributions, and deviations will be corrected by appropriate transformations (natural log, square root, or arcsine square root [Zar 1999, Sokal and Rolf 1981]). Normality is an underlying assumption for many of the statistical analysis procedures we intend to employ. Variable reduction of the independent variables prior to analysis will be based on elimination of redundancy using correlation analyses, and omission of those variables with predominantly zero values (>75%). This reduction will result in substantially fewer of the initial variables in the actual analyses.

The primary statistical analysis will be a randomized block design ANOVA for comparison of amphibian abundances over time. In this design the block effect is related to treatment plot assignment (treated, control);one of each. Because the results are intended for interpretation only for this study area, pseudoreplication is not considered a problem. The treatment effect is year. This yields a model in the following form:

$$Y_{ijk} = 5 + \text{block effect}_i + \text{treatment effect}_j + \text{error}_k$$

Sampling will include one preharvest year, and 5 postharvest years. We calculated sample size estimates using information from the habitat associations study. We used a mean of five animals, with a range 0-10 at any given site. We also used the following specifications for the sample size estimates: we want to be 95% confident that a change of 50% over 5 years will be detected with statistical power (the ability of the test to detect a difference when one exists) set at 0.75. Additionally, the hypothesis tests will be one tailed. We are employing a one-tailed test because we anticipate a decline in amphibian numbers at the site due to changes in microclimate associated with the harvest. This anticipated decline is based on the species' close ties to a very limited series of microclimatic parameters. A minimum sample size was calculated using the above data; we determined that a minimum of 25 sites in each stand (treated, control) was necessary to achieve the above specifications. We are increasing the sample size to 30 sites within each stand for this study to allow for any departures from the distribution and error rates seen in the larger study.

We will also determine if a significant linear relationship exists in the abundance data over time. Sample size estimates for similar levels of power and confidence as those for the ANOVA yielded a minimum sample size of 22 for this test.

If differences are detected in PLST abundances over time, additional analyses to investigate the relationship of forest structure to amphibian abundance will be undertaken.

Protocol

A written protocol describing each task will be available as part of the training for each employee. It will detail the variables to be measured, the equipment to be used, the procedures to be followed, and pitfalls to be avoided. These guidelines will facilitate standardization of the data. The majority of the data will be collected by one to two 2 person field crew who will be trained together at the beginning of the field season and, thus, receive equivalent instruction. Data collectors will always work in pairs, such that less experienced persons can be paired with more experienced ones. Each field crew will have at least one member that is skilled in identification of PLST. Tasks with a high risk of subjectivity, such as visual estimation of substrate sizes or cover values, will be reviewed periodically to assure consistency among all employees.

Table 1. Hierarchical arrangement[1] of ecological components represented by measurements of the forest environment taken in conjunction with sampling for the Siskiyou Mountains salamander (*Plethodon stormi*) in an on-going habitat relationships study (Ollivier and Welsh, *unpubl. data*).

I. Macrohabitat Scale

A. Stand characteristics	B. Dead & down wood: density by size and decay class	C. Shrub & understory composition (>.5m)(%)
Forest age	Stump counts	Large shrub_L
Slope (%)	Snag counts	Understory hardwoods_L
Aspect	Log counts by type	Understory conifers_L
* Elevation	(hardwood or conifer), size	Bole_L
Tree counts by species	(small, large) and decay	Fir species_L
and size (dbh)	class (sound, decayed)	Douglas-fir_L
	Logs_L (%)	Canyon live oak_L

D. Ground-level veg. (<.5m)(%)	E. Ground cover (%)	
Herb_L	Leaf lit_V	Leaf litter_L (%)
Fern_L	Exposed soil_V	Exposed soil_L (%)
Grass_L	Exposed rock total_V	Rock_L (%)
Small shrub_L	Exposed gravel_V	Moss_L (%)
Sword fern_L	Exposed pebble_V	Lichen_L (%)
Oregon grape species_L	Exposed cobble_V	Litter depth (cm)
Poison oak_L	Exposed boulder_V	

[1] Spatial scales arranged in descending order from coarse to fine resolution (see Wiens 1989).
[2] C=counted variables, V=variables in the circular plot that are visually estimated, L=line transect variables, shown as percent of line, P=% of the 196 m2 salamander search area variable.
* Variable is calculated or measured in the laboratory using topographic maps and aerial photos.

Table 1. (continued)

II. Macrohabitat Scale (cont'd)	III. Microhabitat Scale
F. Forest climate	A. Substrate composition
Air temp. (°C)	Mineral soil_P (%)
Relative humidity (%)	Sand_P (%)
Canopy closed (%)	Gravel_P (%)
Soil temperature - soil surface (°C)	Pebble_P (%)
Soil temperature-10cm (°C)	Cobble_P (%)
	Boulder_P (%)
	Bedrock_P (%)
	Leaf litter_P (%)
	Large woody debris_P (%)
	Interstitial spaces count by fill type

PERSONNEL ASSIGNMENTS AND COMPLETION SCHEDULE

The study will be overseen by one GS-13 Research Wildlife Ecologist, one GS-9 Biological Statistician and one GS-7 Wildlife Biologist. Field work will be performed by two GS-5 biotechnicians and the GS-7 Wildlife Biologist. The field work will take place as follows:

Spring 1999 and 2000 - preharvest vegetation and amphibian sampling, datalogger deployment
Summer 2000 - harvest occurs
Spring 2001 - postharvest vegetation and amphibian sampling
Spring 2002, 2003, 2004 - postharvest amphibian sampling only
Spring 2005 - postharvest vegetation and amphibian sampling

Data analysis will occur during the summer and fall months each year. Interim data summaries of amphibian abundances will be submitted each fall/winter. A final report will be submitted within one year of completion of analysis in the final year.

SAFETY AND HEALTH

Safety procedures outlined in the Forest Service Safety Plans should be followed at all times. Safety procedures of concern for this study include defensive driving to and from field sites, as well

as careful movement through the forest to prevent injury. Proper clothing and footwear will be worn at all times and any accidents will be reported promptly.

LACEY ACT

A sampling protocol will be submitted to Humboldt State University for review by the committee on Institutional Animal Care and Use. The protocol will outline the sampling procedures in detail, with particular attention to animal handling and the avoidance of injury during handling.

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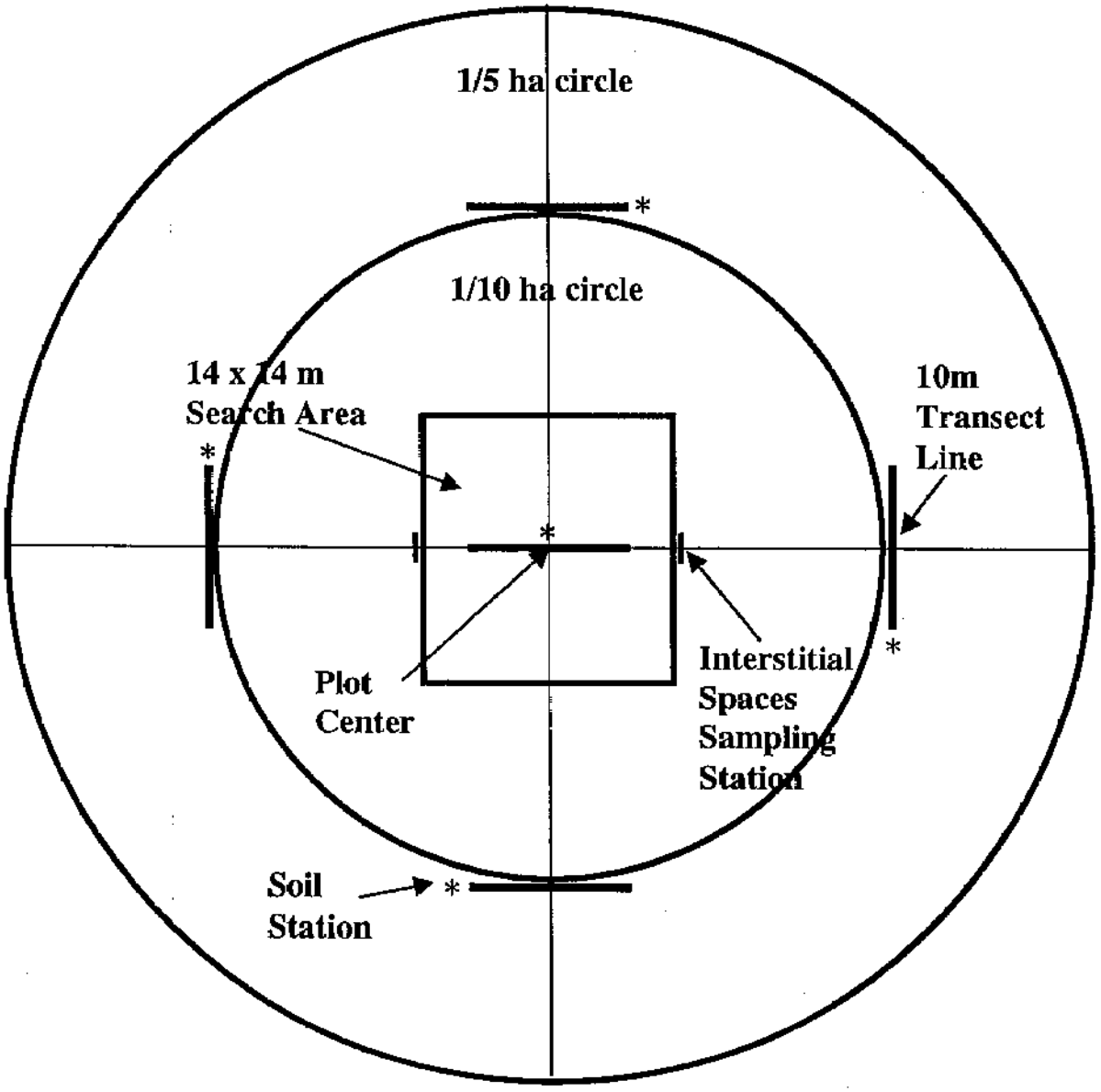
Figure 1. Diagram of the circular plot showing salamander search area placement, plot center, transect lines, soil stations, and interstitial spaces sampling stations for the PLST shaded fuel break study.



Search area = 14 x 14m (196 m^2)
Inner circle = 1/10 ha (17.8 m radius)
Outer circle = 1/5 ha (25 m radius)