PROPOSED ACTION
FOR THE
EDDY GULCH LATE-SUCCESSIONAL RESERVE PROJECT

April 1, 2008

CONTENTS

APPENDICES

EDDY GULCH LATE-SUCCESSIONAL RESERVE PROJECT
PROPOSED ACTION, APRIL 1, 2008

1.1 INTRODUCTION

The United States Department of Agriculture (USDA) Forest Service, Klamath National Forest, Scott-Salmon River Ranger District is proposing treatments in the Eddy Gulch Late-Successional Reserve (LSR) to reduce the threat of stand-replacing wildfire and accelerate the development of early and mid-successional stands into late-successional forest habitat.

The potential for large, high-intensity fire is a primary concern in the Eddy Gulch LSR. Current management issues [needs] include the reduction of high fire hazard conditions, protection and/or development of late-successional habitat, and the protection of areas that may have watershed-related features at risk (1999 Klamath National Forest Forestwide Late-Successional Reserve Assessment). Also of concern is the protection of private property and emergency access routes that pass through the LSR. The Proposed Action addresses these management needs.

The Proposed Action has been designed to meet the purpose of the Eddy LSR Project (expressed below in three resource objectives) and to satisfy the need for action by using mechanical and prescribed burn treatments to reduce fuels and minimize the threat of stand-replacing wildfire and to improve late-successional forest habitat. The three objectives are as follows (no priority is assumed):

1. *Community Protection*—Reduce wildfire threat to communities and municipal water supplies and increase public and firefighter safety.

2. *Habitat Protection*—Protect existing and future late-successional habitat from threats (of habitat loss) that occur inside and outside LSRs.

3. *Habitat Development*—Promote the continued development of late-successional characteristics.

These objectives helped guide the development of proposed treatments and activities to maintain or establish a trend towards desired resource and social conditions.

1.2 IDENTIFYING TREATMENT LOCATIONS

The proposed treatment locations and types were developed in response to protection targets identified in the Salmon River Community Wildfire Protection Plan (CWPP), Black Bear Ranch Cooperative Fire Safe Plan, Rainbow Cooperative Fire Safe Plan, the Stewardship Fireshed Analysis that was conducted for the Eddy Gulch LSR Project, citizen collaboration workshops for the Fireshed Analysis and Eddy Gulch LSR Project, and from direction provided by the U.S. Fish and Wildlife Service (FWS) in Yreka, California. Numerous Forest Service documents guided development of this Proposed Action; those are the Klamath National Forest Forest-wide Late-Successional Reserve Assessment, Klamath National Forest Land and Resource Management Plan, Upper South Fork

Ecosystem Analysis, North Fork Ecosystem Analysis, and Callahan (Main Salmon) Ecosystem Analysis.

1.2.1 Salmon River CWPP

The CWPP identifies community and individual water sources (watersheds and intake structures) for which water quality, and the structures themselves, could be degraded by wildfire. Two communities, Cecilville (south of the Eddy Gulch LSR) and Sawyers Bar (to the north of the LSR), are listed in the *Federal Register* (2001) as communities at risk from a wildfire. The community of Forks of Salmon (west of the LSR), although not listed in the *Federal Register*, was also considered during design of the proposed treatments. A fire outside or emanating from, the Eddy Gulch LSR could adversely affect these communities and related infrastructure. Map A-1a in Appendix A highlights the protection targets identified in the CWPP (October 2007). Map A-1b also shows the CWPP protection targets but includes more detail of the surrounding area. The core Interdisciplinary Team (ID Team) facilitated numerous collaboration meetings with residents of Sawyers Bar, Forks of Salmon, Cecilville, Orleans, and Yreka; the FWS in Yreka; and local officials to discuss the CWPP protection targets, identify any other areas of concern, and present the Stewardship Fireshed Analysis for the Eddy Gulch LSR. These meetings were conducted as part of collaboration requirements under the *Healthy Forests Restoration Act*.

The Salmon River CWPP, dated October 30, 2007, identified the following five types of protection areas (these are identified on Map A-1a).

1. *0.25-mile buffers*—public property surrounded by private property (CWPP page 30).
2. *Municipal watersheds*—Eddy Gulch, Black Bear Ranch – Argus and Callahan Gulches, Cecilville – Crawford Creek, White's Gulch – Count's Gulch, Rainbow Mine – Music Creek.
3. *Property buffers*—these are 200-foot buffers on public property surrounding private properties.
4. *Special areas*—areas below upslope private properties located high on slopes, as well as culturally or biologically significant areas (CWPP page 30) that are at risk from fire spreading up toward the property.
5. *Emergency access routes*—200 feet above and below the road; prescription policy number 3 (CWPP page 30).

1.2.2 Black Bear Ranch Cooperative Fire Safe Plan, 2002

The Black Bear Ranch Cooperative Fire Safe Plan states that the "Black Bear Ranch property is at high risk of being burned over in a wildfire. The houses lie at the bottom of the upper half of the watershed. This slope position is considered a high risk in terms of fire behavior. Access would be particularly threatened in the case of a fire coming from above." The plan lists the following as high-value areas on the property:

- *Residence areas*—eight cabins and two house sites within or directly adjacent to the property boundary.

- *Community safety areas*—two large meadow areas and several other smaller areas.
- *Community water systems*—irrigation ditch system and pond.
- *Potable water system*—the main house water is piped from a spring box behind the house.
- *Hydro and fire safety*—the electricity at the Ranch comes from a small hydro system; a fire hydrant is equipped with a 600-foot fire hose.
- *Gardens and orchards*—there are four main garden areas and two orchards.
- *Historic sites*—old sawmill; other historic buildings and sites are included in other high-value areas.

1.2.3 Rainbow Cooperative Fire Safe Plan, 2003

The Rainbow Cooperative Fire Safe Plan states that the Rainbow property is at "high risk of being burned over in a wildfire. The houses are near the top of the ridge with much fuel below. Access and egress would be particularly threatening in the case of a fire coming from below." The plan lists the following as high-value areas on the property:

- *Residence areas*—there are four active and/or potential residential areas.
- *Community safety area*—there is one large "landing" area.
- *Community water*—there is a water system and storage.
- *Access route*—the main road (40N54 and 40N54.4) is the only emergency access route.

1.2.4 Stewardship Fireshed Analysis for the Eddy Gulch LSR

The Stewardship Fireshed Analysis (SFA) provides a detailed discussion about the SFA process. The process was developed by the Pacific Southwest Regional Office of the USDA Forest Service Fuels Management Staff. It was designed to promote the collaborative development of treatments for a large landscape. Its intent is to bring together diverse disciplines, stakeholders, and the Forest Service management team to develop projects that protect the forests, and the communities around the forest, from catastrophic (standing-replacing) wildfires. The SFA process was used to develop modeling schemes to mimic historic wildfire and weather. Once the weather data and the problem fire scenario were well developed, the core ID Team (fire-fuels specialists, silviculturist, and biologist) was able to see what effects a wildfire would have on a particular area, such as the Eddy Gulch LSR. During citizen collaboration meetings, the fire behavior modeling gave the public an opportunity to comment on where they felt treatments should be applied. The modeling also showed the ID Team where the most impacts from a wildfire would likely affect the LSR.

The core ID Team then looked at logical locations and types of treatments in the LSR. The prescriptions for these treatments were again tested with the problem fire to provide the team with an idea of how effective the treatments would be in reducing wildfire losses. The SFA for the Eddy Gulch LSR is incorporated by reference (authors: Barry Callenberger and Brooks Henderson, February 15, 2008).

1.2.4.1 Protection Targets

One goal of the SFA for the Eddy Gulch LSR (and a goal of all fireshed assessments) was the identification of protection targets—those areas that would be threatened by wildfire. These targets are based on protection of life and property first, then other high-value resources identified in the Salmon River CWPP and by the ID Team. Maps A-1a and A-2 highlight areas of concern in the Klamath National Forest, such as community wildland-urban interface (WUI) areas identified in the CWPP, municipal watersheds, emergency ingress and egress routes, in addition to northern spotted owl (NSO) nest sites and habitat, and other important resources and historic features. Some of the WUI project areas are inside the SFA evaluation area. These areas were considered during design of the proposed treatments and locations of treatments.

1.2.4.2 The Problem Fire

Another goal of the SFA was to identify the problem fire. The problem fire is not a single modeled wildfire, but rather a combination of data and attributes that include historic weather, historic large fire behavior and conditions, existing fuels and topography, historic ignitions that would contribute to fire spread and severity of wildfires, historic response capability (suppression), and Geographic Area Command priority. To identify the problem fire, the SFA process required the use of several fire behavior models (FARSITE, FLAMMAP), a weather and fire history analysis tool (FIREFAMLY Plus), and a Geographic Information System software called ArcGIS. The primary drivers for considering types of treatments and location of treatment proposed for the Eddy Gulch LSR Project are the results of the FLAMMAP runs, recent large fires near the LSR, and current fuels conditions from stand modeling and fire risk from lightning. The modeling demonstrated the potential for fire occurring on the Eddy Gulch LSR landscape, and what fire would do to vegetation, and potentially to public and private concerns, if treatments were not implemented to reduce fire potential. This modeling, and extensive fire experience of the modeler, allowed the modeler to test proposed vegetation treatment prescriptions against the problem fire to analyze their effectiveness in reducing wildfire effects and potential resource losses. Map A-3 shows the FlamMap analysis of modeled surface and crown fire activity in the Eddy Gulch LSR. The map includes only the outlines of the proposed Fuel Reductions Zones (FRZs), the mechanical and prescribed fire treatment areas inside the FRZs, and the mechanical and prescribed fire treatment areas in other areas of the Eddy Gulch LSR Project Assessment Area. This was done to demonstrate how the proposed treatments were designed to respond to the potential for fire occurring on the Eddy Gulch LSR landscape based on the results of the models created for the SFA.

1.2.5 U.S. Fish and Wildlife Priority Areas

The FWS in Yreka, California, identified four Priority Areas (Map A-4). These areas contain large blocks of high-quality NSO habitat, provide for small NSO population clusters within the Eddy Gulch LSR, or are important for connectivity at a larger scale. Two of the areas (FWS-2 and FWS 4 on Map A-4) are entirely within the Eddy Gulch LSR Project Assessment Area and would benefit from treatments to both protect the areas from wildfire and develop late-successional habitat. The majority of one other FWS Priority Area (FWS-1) lies in designated roadless areas (which are excluded from the Eddy Gulch LSR Project), but a small portion of it does lie within the Eddy Gulch LSR Project Assessment Area; it would benefit from proposed treatments. One FWS Priority Area (FWS-3) lies completely within designated roadless areas and is not close enough to any proposed treatment area to benefit from treatments. Map 4 also shows the potential NSO habitat development

areas. Map 5 depicts only the potential NSO habitat development areas, which have been overlaid on the map of proposed treatment areas to show the types of treatments that would occur in those habitat development areas. The types of treatments could change based on field exams in the spring/early summer of 2008.

1.3 DESCRIPTION OF THE PROPOSED ACTION

1.3.1 MANAGEMENT OBJECTIVES

The suite of treatments that compose the Proposed Action have been designed to

- protect private property and emergency access routes, through reduction of fire hazards along designated roads;
- break up fuel continuity and provide strategic locations to initiate suppression and prescribed fire actions;
- protect habitat from stand-replacing fire;
- improve habitat conditions; and
- accelerate development of mid-successional stands to late-successional stands.

1.3.2 TREATMENT OBJECTIVES

The objectives for mechanical and prescribed burn treatments proposed for the Eddy Gulch LSR Project are to

- increase average tree size, thereby increasing tree resiliency to disturbance events;
- reduce tree mortality from wildfire events;
- reduce excessive accumulation of down woody material in size classes smaller than 3 inches in diameter;
- facilitate prescribed burning programs to maintain fuel profiles at levels to protect late-successional characteristics by favoring tree species that naturally occur in the presence of fire;
    - construct FRZs throughout the LSR to give fire managers more options for selecting an appropriate management response to a wildfire;
    - allow for the implementation of prescribed fire in large areas outside of FRZs in order to reduce ground fuel accumulations, scorch to kill brush, and reduce the crown base height within the stands through fire pruning the lower limbs of trees (the objective of this treatment is to reduce wildfire impacts in the larger area and keep wildfire effects to primarily surface fires, with occasional torching);
    - manipulate vegetation to favor Douglas-fir, ponderosa pine, sugar pine, incense-cedar, and black oak within the Assessment Area, where sites permit, in an effort to increase

resiliency to wildfire by mimicking species compositions favored by naturally occurring fire prior to European settlement;

- improve growth rates and minimize mortality, which enables development toward higher levels of older and larger trees; and
- develop vegetation treatments that support sustainability of late-successional conditions across the landscape to provide habitat for late-successional-dependent species.

1.3.3 SUCCESSIONAL STAGE DEFINITIONS

These definitions are provided in this section to assist the reader in understanding terminology used to describe treatments for the various successional stages.

- **Early successional conifers and hardwood vegetation**. This vegetation consists of early successional vegetation (grass, forbs, brush, and saplings) found in plantations and other areas where disturbance has created forests less than 20 years of age. Some areas range from 3 to 40 acres in size and contain relatively pure stands or a mixture of Douglas-fir, sugar pine, and ponderosa pine at lower elevations and white fir and red fir at higher elevations. Other early successional vegetation (pole size) is found in plantations over 20 years old and has variable structural diversity. Tree sizes range from 6 to 11 inches diameter at breast height (dbh).

- **Mid-successional**: Most of these stands are even-aged and dense. Denser stands have suppressed growth potential, increased mortality due to high stocking levels, and increased fuel loading due to density and mortality. Tree sizes range from 12 to 24 inches dbh.

- **Late-successional**: These stands are multistoried, with conifers in the overstory and hardwoods/shade-tolerant conifers in the understory. The density of the understory is increasing competition for available nutrients, causing stress to overstory trees and resulting mortality. Tree size is larger than 24 inches dbh.

1.3.4 DESCRIPTIONS OF PROPOSED TREATMENT TYPES AND METHODS

The treatments proposed in this document were designed to reduce the size and intensity of large fires that may ignite inside the LSR or ignite outside and threaten to enter the LSR. The following descriptions of treatment types apply regardless of where in the Assessment Area the treatments would occur. The purpose of this section is to define the treatment types so the reader understands the terminology used in this document.

1.3.4.1 Mechanical Treatment Types

Mechanical fuel reduction treatments permit desired conditions to be reached sooner and more effectively than prescribed burning alone. Mechanical treatments can precisely target a specific stand, tree size, or tree species. Manually cutting or using machinery allows for the selection of individual trees or brush for removal or retention. The proposed mechanical treatments would be used to remove or rearrange fuels to reduce crown, ladder, and ground fuels and to shorten the time to reach the desired future conditions compared to implementing prescribed fire techniques without

mechanical pre-treatment. And, in some situations, the use of mechanical treatments is more controllable and produces less smoke than prescribed fire. Thinning in FRZs is expected to set up the landscape for Appropriate Management Response and confine suppression strategies to encourage fire events as maintenance actions in the future. The following are the primary ways that mechanical treatments would be implemented to reduce fire hazards posed by dense vegetation and heavy ground fuel loading and to develop wildlife habitat:

Thinning

- *Thinning to reduce stand density*—Stands would be thinned to reduce stand densities, thereby reducing canopy cover and the potential for passive and active crown fires. The resulting fuels from thinning would be removed or piled and burned. Thinning activities would also provide an opportunity for biomass utilization of the material.

- *Thinning to reduce ladder fuels*—Thinning smaller diameter trees increases the distance between the lower limbs of residual trees and brush or ground fuels. Ladder fuels consist of denser conifer vegetation and brush near the forest floor that can extend into residual trees. Ladder fuels increase the likelihood of a ground fire creating enough heat to ignite the ladder fuels (torching), with the subsequent fire reaching the crowns of the largest trees. Crown fires are more intense, impossible for firefighters to suppress, and result in more devastating fire effects. In an effort to reduce the potential for crown fires, ladder fuels would be mechanically treated. After mechanical treatments, the fuels would be removed and treated with prescribed fire or masticated.

- *Thinning to develop habitat*—Overstocked mid-successional stands experience inter-tree competition that slows the stand's development into late-successional habitat. Thinning these stands from below would maintain or increase growth on the residual trees, thus accelerating the stand's development into late-successional habitat. In an LSR, stands would be considered for treatment only where thinning would increase, by 30 years, the stand's development into late-successional habitat, when compared to the stand's projected natural (unthinned) development.

Mastication

- Mastication would be proposed where the dominant fuels are small trees, brush, and ground fuels, and they are at or below desired conditions, and resultant fuel bed would not directly threaten public safety, improvements, municipal watersheds, and habitat characteristic. Woody shrubs and trees would be masticated using mechanical ground-based equipment to grind harvest residue or thinnings, except in those portions of Riparian Reserves where mechanical treatment would not be allowed. Shrubs and trees less than 10 inches dbh would be masticated, unless the trees are needed for proper spacing. Most masticated trees would be less than 6 inches dbh. Spacing of residual conifers and black oaks in plantations would range from approximately 18 feet to 25 feet apart. The spacing would be wider in areas with larger size trees. This would allow retention of the healthiest, largest, and tallest conifers and black oaks and would avoid creating openings. Generally, mastication would be the final fuel treatment unless mastication is needed as a pre-treatment for underburning to mitigate a hazardous fuel profile, or the post-mastication ground fuel loadings exceed the desired conditions substantially.

Hand Cutting and Piling of Trees and Shrubs and Pile Burning

- Shrubs and trees that are 1 to 6 inches dbh would be manually cut from beneath overstory trees, and aggregations of small-diameter (less than 10 inches) conifers or plantation trees would be thinned. The cut trees, shrubs, and existing slash would be manually piled and burned. The spacing of residual conifers and black oaks would be approximately 18 feet to 25 feet apart to allow retention of the healthiest, largest, and tallest conifers and black oaks and to avoid creating openings.

Firelines constructed for burning

- *Hand lines* would be scraped to mineral soil to a minimum width of 2 feet and vegetation cleared to a minimum width of 6 feet. Dead fuel would be scattered away from the mineral soil scrape to reduce fireline intensities.
- *Machine lines* would be scraped to mineral soil to a minimum width of 6 feet and vegetation cleared to a minimum width of 10 feet.

Hand thinning and piling in Riparian Reserves

- Depending on local site conditions, hand thinning would be used in the Riparian Reserves where mechanized equipment is excluded. In such areas, conifers from 3 feet in height to 6 inches in diameter would be hand thinned to a spacing of about 15 feet. All hardwoods and riparian vegetation would be retained. Whenever possible, hand piles would be located away from riparian vegetation to prevent scorching.

1.3.4.2 Mechanical Treatment Methods

The following methods may be used:

- Chainsaws to cut trees for purposes of thinning stands and reducing ladder fuels.
- Tractors or cable systems to remove trees that have been cut by chainsaws; also refers to the use of feller-bunchers—tracked or wheeled vehicles with lopping shears or saws that cut and collect trees for skidding or forwarding to a landing site.
- Helicopter to remove logs and slash from locations that are not practical for using ground-based machines.
- Grapple pile using low ground pressure tracked machines for gathering and piling of ground fuels and brush.
- Tractor piling of brush and slash and burned on ground less than 35 percent slope.
- Mastication using low ground pressure tracked or wheeled machines with a masticator head. Would be used to grind slash produced from mechanical thinning and existing ground fuels. Masticated material would be left scattered in the treatment area. Masticated particle size should not exceed 18 inches by 3 inches by 3 inches.

Secondary Treatments Following Mechanical Treatments

Secondary treatments are necessary to meet desired condition objectives. Thinning increases crown spacing and reduces ladder fuel conditions, but in identified high fire hazard areas, a secondary

treatment is required to dispose of activity-generated ground fuels and existing ground fuels to significantly decrease the potential for stand-replacing fire effects. Secondary treatments for the Proposed Action would include mastication and prescribed burning, which includes burning piles of slash and broadcast underburning (broadcast underburning is referred to as underburning in this document).

1.3.4.3 Prescribed Burn Treatments

Prescribed burn (also called prescribed fire or controlled burning) is one of the most important natural resource management tools used on federal lands. Prescribed fire is the skilled application of fire under a particular set of weather and fuel conditions to achieve one or more specific natural resource objectives, such as hazardous fuel reduction, wildlife management, and ecosystem restoration and maintenance. The most common objective of prescribed burning is for fuels reduction, in which the goal is to interrupt the horizontal, and sometimes vertical, continuity of flammable materials on the forest floor. Underburning techniques are cost-effective tools for hazard reduction and habitat protection and improvement. Underburning in one operation can mitigate all three elements of a hazardous fuel profile (ground and ladder fuels and crown spacing / crown bulk density) in the short term. Underburning is effective on all aspects and topographic features.

The number of years that an underburn will remain effective is lengthened when manual or mechanical treatments are done before underburning to reduce existing hazardous ground fuel conditions and to thin saplings, poles, and larger-sized trees. Without pre-treatment, trees and limbs (that would have been removed in pre-treatment) are scorch killed by fire and eventually fall to the ground, thereby accelerating the accumulation of ground fuels and requiring another burn to maintain the desired effects.

1.3.4.4 Prescribed Burn Methods

The following methods would be used:

- *Pile burning*—naturally occurring fuels and thinning residues (branches, tops, and limbs) would be piled in compact piles where a pile's height does not exceed the pile's width. Piles may be covered to protect ignition points, and handlines may be installed either around individual piles or around the treatment area. Piles can be burned in wetter conditions than underburning, allowing more opportunities for accomplishment. Burning would be done on permissive burn days determined by the local Air Quality Management District.
- *Underburning*—prescribed fire would be ignited and managed under optimum conditions to consume portions of dead and down fuels and to scorch to kill vegetation to reduce fuel ladders under residual stands of trees.
  - All portions of mechanical areas would be evaluated for underburning after thinning. The underburns would be conducted to have an average flame length of 4 feet, less than 15-foot scorch height, and not create openings that are more than 20 percent of the stand area and are less than 0.5 acre in size.
  - Initial on-site surveys, known information on weather and fire history, and initial fire modeling indicate the need for a uniform fuel treatment that modifies all components of the fuel profiles, crown, ladder, and ground fuels to reduce the probability of passive and

active crown fire behavior, which is currently predicted to impact 50 percent of the Assessment Area. Underburning in mechanical areas would be the secondary treatment and the primary fuels treatment where no mechanical treatments are proposed. Where underburning is proposed in mechanical areas, the objective is to mitigate the fuel ladder concern by reducing ground fuels generated from mechanical thinning, existing ground fuels, and small-diameter trees and brush that remain after mechanical treatments. Underburning in areas with no mechanical treatment has a much broader objective; that is, to reduce existing ground fuels and scorching to kill brush, small trees, and the lower limbs of larger trees to achieve a crown base height that averages from 8 to 15 feet above the ground.

1.3.5 PROPOSED TREATMENT LOCATIONS

The mechanical and prescribed burn treatments are proposed for the following locations:

1. Along ridges—these are the Fuel Reduction Zones (FRZs), which contain plantations, Riparian Reserves, roads, and habitat development areas, community protection targets;
2. Along roads—emergency access routes, open National Forest System roads, and county roads (roads occur inside and outside FRZs);
3. Areas outside FRZs—include underburn areas, which contain plantations; Riparian Reserves; mechanical treatment areas and roads; and habitat development areas.

All treatment areas are shown on Maps A-6a and A-6b. Tables B-1 thru B-4 (all tables are located in Appendix B) correspond to these maps.

The following is a summary of proposed treatment acres across the Eddy Gulch LSR Assessment Area. The various treatment types overlap, so the total area proposed for treatment is less than the sum of the acreages shown below:

- 1,999 acres of mechanical treatments in FRZs
- 8,583 acres of underburn in FRZs
- 17,808 acres of underburning in prescribed burn areas (areas other than in FRZs)
- 2,251 acres of mechanical treatments in prescribed burn areas
- 102 acres of mechanical treatments not in an FRZ or prescribed burn area
- 70 miles of mechanical treatments along roads
- 4.5 miles of temporary road construction to access 885 acres in 14 of the mechanical treatment areas

1.3.5.1 Location 1: Along Ridges

An FRZ is a strategically located and designed strip of land on which a portion of the surface fuels (both living and dead), ladder fuels, and canopy fuels are treated (removed, burned, or masticated) in order to limit the potential size of and loss of resources (including homes) from large, high-intensity wildfire. FRZs are wide enough to capture most short-range spot fires within the

treated areas and are designed to bring crown fires into surface (ground) fire conditions, as well as to provide safe locations for fire-suppression personnel to take fire-suppression actions during 90th percentile weather conditions.

Basis for Choosing FRZ Locations. The decision to develop a scheme of FRZs along ridges in the Eddy Gulch LSR was, for a large part, based on SFA modeling results. The ID Team considered the following questions when determining the most effective locations for constructing the FRZs:

- Based on FlamMap and Farsite fire behavior modeling and data on past fire history, where are the areas with the greatest likelihood of high-intensity fire?
- How could the Eddy Gulch LSR be protected from fires originating outside the LSR?
- What areas have the highest number of protection targets, such as WUI areas, evacuation routes, watersheds, NSO habitat, and FWS priority protection areas?
- What high-elevation ridges (above the inversion layer—about 4,800 feet) would serve as the best locations for prohibiting wildfire from spreading into an adjacent watershed?
- What ridges have prominent geographical features that could serve as natural barriers for fire spread?
- Are there access points (roads) to the ridges for implementing treatments within an FRZ?
- What locations would provide the greatest potential for continuity of treatments within an FRZ and the potential to create continuity to the other proposed FRZs?
- How could habitat in the roadless areas be protected?

Function of FRZs. The FRZs were designed to (1) reduce the extent of wildfire severity by limiting the amount of area affected by wildfire; (2) create areas where fire suppression efforts can be conducted more safely and effectively; (3) break up continuity of fuels over a large landscape; and (4) serve as anchor points for further area-wide fuel treatments, such as underburning.

Mechanical and prescribed burn treatments are proposed in the FRZs; treatments would also occur along roads in the FRZs and along roads that do not occur in an FRZ (see Maps A-6a and A-6b and Tables B-1 thru B-4). The FRZs would provide opportunities to use prescribed fire inside areas bordered by FRZs to allow fire managers a wider range of alternatives during wildfire suppression. FRZs, combined with other fuel treatments, would provide Fire Management with opportunities to allow fire to play a more natural role in the LSR ("natural" being defined as low to moderate intensity surface fire with a pattern of varied severity).

Mechanical Treatments in FRZs in Early Successional Conifers and Hardwood Vegetation

Plantations and young natural stands of trees less than 10 inches in diameter dbh may be mechanically treated in FRZs. These areas will be identified and evaluated during the intense field reconnaissance stage in the spring of 2008.

Purpose of Mechanical Treatments in FRZs in Early Successional Conifers and Hardwood Vegetation

- Modify the fuel profile using the following indicators: canopy fuels, ladder fuels, and ground fuels to reduce rate of spread, flame length, and probability of crown fire behavior to meet the range of desired conditions during 90th percentile weather conditions.
- Create locations to initiate action for wildfire suppression and prescribed fire.

Secondary Treatments

- Underburning
- Pile burning
- Mastication
- Water barring
- Fireline construction
- Obliteration and rehabilitation of fireline construction

Protecting and Developing Habitat in FRZs in Early Successional Conifers and Hardwood Vegetation

Thinning in habitat areas would serve two purposes: to protect habitat from stand-replacing fire and to develop (or accelerate) the growth of early and mid-successional stands into late-successional stands. Habitat areas proposed for protection include FWS Priority Areas, NSO activity centers, and potential NSO habitat development areas (Table B-5 and Maps A-4 and A-5) that are at risk from fire. The areas proposed for habitat development are suitable stands within the potential NSO habitat development areas shown on Map A-5.

Purpose of Treatments—Habitat Protection

- Protect NSO activity centers, especially core areas, from fire.
  - Protect FWS Priority Areas from fire.
  - Protect unoccupied but potential NSO habitat from fire (these potential NSO habitat development areas are generally low- to mid-elevation subwatersheds that could sustain enough late-successional forest to support an NSO activity center).

Treatment Locations. Thinning treatments to protect habitat are proposed on 1,750 acres—the treatment area locations are shown on Maps A-5, A-6a, and A-6b).

Purpose of Treatments—Habitat Development

- Develop stand structure that will result in a stand that meets the description of expected stand attributes listed in the 1999 Klamath National Forest Forest-wide Late-Successional Reserve Assessment.
  - In stands between 80 and 150 years old, accelerate attainment of late-successional conditions by at least 30 years.
  - Create an amount of late-successional habitat that is between 45 and 65 percent identified functioning range to ensure continued functionality following inevitable natural disturbances.
- Develop NSO habitat areas to provide more suitable habitat for NSOs. The areas on the landscape capable of sustaining or likely to sustain NSO activity centers, assuming suitable vegetation structure is present, would be
  - large enough to contain an activity center (500-acre scale or larger).
  - located in subwatersheds with concave topography.
  - located on the lower one-half to two-thirds of the slope (on the scale of the subwatershed).
  - located near a stream.
- Other factors considered, although they may not directly affect NSO occupancy, include the following:
  - Areas less prone to stand-replacing fire (below the 4,800-foot inversion layer, northwest- to southeast-facing slopes).
  - Areas mapped as Fire Regime Condition Class 3.
  - Steep slopes greater than 35 percent, given the apparent habitat preferences of barred owls, which are displacing NSOs over most of their range.

Treatment Locations. Thinning treatments to develop habitat are proposed on 457 acres—the treatment area locations are shown on Maps A-5, A-6a, and A-6b. The proposed thinning would promote stands that meet the description of expected stand attributes listed in the 1999 Klamath National Forest Forestwide Late-Successional Reserve Assessment.

Secondary Treatments

- Slash within 50 feet of the road would be piled for burning.
- Slash concentrations more than 50 feet from the road would be lopped and scattered, not to exceed 18 inches in depth, and scattered away from residual trees.

Mechanical Treatments in FRZs in Mid-Successional Stands

The proposed treatment areas were identified during the initial reconnaissance stage. They are located within 1,000 feet of an existing road and have dense stocking levels that need to be thinned to meet

fuel management or habitat development objectives. Approximately 1,999 acres of trees greater than 10 inches would be mechanically treated in FRZs. Table B-2 lists the FRZs where these mechanical treatments would occur. Maps A-6a and A-6b show the locations of all FRZs and mechanical treatment areas.

Purpose of Thinning Treatments in Mid-Successional Stands

- Meet public safety objectives in FRZs.
- Provide for firefighter safety in FRZs.
- Reduce unacceptable fuel conditions in FRZs.
- Create locations to initiate action for wildfire suppression and prescribed fire.
- Meet habitat development objectives.

Secondary Treatments

- Slash within 50 feet of the road would be piled for burning.
- Slash more than 50 feet from the road would be lopped and scattered, not to exceed 18 inches in depth, and scattered away from residual trees.

Prescribed Burn Treatments in FRZs

Each FRZ is comprised of an entire prescribed burn area, with mechanical treatment areas planned throughout the FRZs. There are 20 proposed FRZs (Maps A-6a and A-6b) on approximately 8,583 acres. Information about the acres of underburning in FRZs is presented in Table B-2.

Purpose of Prescribed Burn Treatments in FRZs

- Modify the fuel profile using the following indicators: canopy fuels, ladder fuels, and ground fuels to reduce rate of spread, flame length, and probability of crown fire behavior to meet the range of desired conditions during 90th percentile weather conditions.

Follow-up Treatments

- After mechanical and underburn treatments, the areas should be monitored, and follow-up treatments employed when monitoring shows a need for secondary and possible maintenance treatments.
- *NSO habitat protection and development Areas*—underburning may include mechanical or hand thinning as a pre-treatment where required for safety or habitat protection. Implementation of underburns would comply with guidelines contained in the 1995 Klamath National Forest Land and Resource Management Plan.

Prescribed Burns in Riparian Reserves. Riparian Reserves are located throughout the Assessment Area (refer to Tables B-1, B-2, and B-4). Maps A-7a and A-7b show the locations of Riparian Reserves. Treatments in the reserves would be the same regardless of their location in the Assessment Area (inside or outside FRZs). To maintain soil stability and shading necessary to protect Riparian Reserve attributes, fuel treatments would be in the form of underburning into these reserves.

Many reserves, especially ones at the head of drainages, can have heavy accumulation of ground and ladder fuels, as well as dense canopies. Riparian Reserves occur primarily on the edges of FRZs, and relatively small portions occur in mechanical treatment areas—these areas would be flagged and avoided as equipment exclusion zones that would still allow reach-in by grapples or full suspension yarding. Treatments in Riparian Reserves would include underburning, hand piling, and hand thinning, except in some plantations where mastication may be prescribed. In these plantations, the trees would be removed or masticated to within 25 to 50 feet of the edge of the stream. Underburns would be ignited above the Riparian Reserves, and fire would be allowed to back down the slope toward the stream.

Purpose of Treatments in Riparian Reserves

- Preserve riparian attributes.
- Maintain existing soil stability.
- Contribute to attainment of Aquatic Conservation Strategy objectives.

Prescribed Burns in Plantations. Plantations are present throughout the Assessment Area (inside and outside FRZs) (Maps A-7a and A-7b and Tables B-1, B-2, and B-4). Plantations are included in underburn acres but may be lined and avoided or burned under different underburn conditions after onsite review and evaluation. It is important to protect plantations from fire hazards because they contribute to early successional stage development. Fuel loading and vegetation conditions in many of the plantations could potentially generate very high to extreme fire behavior that can impact adjacent habitat and add to the difficulty of suppressing or controlling a wildfire.

Purpose of Treatments in Plantations

- Reduce fuel loading to result in less than 2-foot flame length at 90th percentile weather
- Scorch to kill at least 50 percent of brush

1.3.5.2 Location 2: Along Roads

Mechanical thinning treatments are proposed to provide safety along roads. These treatments are designed to protect roads from hazard trees that could fall and block roads and to keep fires that spread to the road edge from blocking travel for the public and fire suppression personnel. Roadside treatments would occur inside and outside FRZs. There would be a 200-foot buffer on both sides of each road. Maps A-1a, A-6a, and A-6b show the roads that would be treated. Table B-2 identifies the acres of roads treated in FRZs, and Table B-3 presents the miles of roadside treatment by route number for the entire Assessment Area.

Basis for Choosing Road Treatments. The ID Team considered the following questions when determining what roads should be treated:

- Do all roadside treatments for the Eddy Gulch LSR Project include roads identified in the Salmon River CWPP and conform to the roadside treatment standards recommended in the Salmon River CWPP?

- Are there other roads in the Assessment Area that need fuel treatments to protect health and safety of firefighters and the public? (These roads include open National Forest System roads and Siskiyou County roads necessary for safe ingress and egress.)
- What locations along the CWPP-identified routes does fire behavior modeling and fire suppression experience show that flame lengths could span the roads, and smoke would obscure visibility for extended periods from the heavy fuels that buffer the roads?

Treatments Locations

- Along emergency access (ingress and egress) routes (identified in the Salmon River CWPP (refer to Maps A-1a and A-1b).
- Along open National Forest System roads and county roads in the FRZs (refer to Maps A-6a and A-6b).

Purpose of Treatments

- Reduce fire behavior (flame length, fire intensity) along roads.
- Improve public and firefighter safety along identified emergency ingress and egress routes by implementing thinning and surface fuel treatments.
- Create locations to initiate action for wildfire suppression and underburn projects.

Secondary Treatments

- Slash within 50 feet of roadsides would be piled.
- Slash more than 50 feet from the road would be lopped, not to exceed 18 inches in depth, and scattered away from residual trees.
- Chip, spread, or remove debris from within the 50-foot strip along roads as a treatment alternative.

1.3.5.3 Location 3: Treatment Areas Outside FRZs

Mechanical Treatments Outside FRZs

Basis for Locating Mechanical Treatment Areas Outside FRZs. The ID Team considered the following questions when designing mechanical treatments to mitigate hazardous fuel conditions in areas that are not in FRZs.

- Are there NSO Core areas that would require pre-treatment to reduce the risk of excessive mortality?
- Are there areas of dense vegetation and heavy ground fuel loading that would add complexity to the prescribed burn but that could be mitigated with pre-treatment?
- Are there dense mid-successional stands where thinning would benefit development into late-successional habitat?
- Are there areas lacking NSO activity centers that could sustain suitable habitat?

- Are there areas on the landscape that are most likely to provide sustainable NSO habitat?

Purpose of Mechanical Treatments in Early Successional Conifer Stands and Hardwood Vegetation

- Thinning treatments in these stands would achieve reductions in tree density and ladder fuels and would expedite habitat development.

Purpose of Mechanical Treatments in Mid- Successional Stands

- *Thinning to develop habitat*—Overstocked mid-successional stands experience inter-tree competition that slows the stand's development into late-successional habitat. Thinning these stands from below would maintain or increase growth on the residual trees, thus accelerating the stand's development into late-successional habitat. In an LSR, stands would be considered for treatment only where thinning would increase, by 30 years, the stand's development into late-successional habitat, when compared to the stand's projected natural (unthinned) development.

- Thinning objectives to reduce density and ladder fuels, as discussed under "Late-Successional Stands" below, may also be attained.

Purpose of Mechanical Treatments in Late-Successional Stands

- *Thinning to reduce density*—Stands would be thinned to reduce stand densities, thereby reducing canopy cover and the potential for passive and active crown fires. The resulting fuels from thinning would be removed or piled and burned. Thinning activities would also provide an opportunity for biomass utilization of the material.

- *Thinning to reduce ladder fuels*—Thinning smaller diameter trees would increase the distance between the lower limbs of residual trees and brush or ground fuels. Ladder fuels consist of denser conifer vegetation and brush near the forest floor that can extend into residual trees. Ladder fuels increase the likelihood of a ground fire creating enough heat to ignite the ladder fuels (torching), with the subsequent fire reaching the crowns of the largest trees. Crown fires are more intense, harder for firefighters to suppress, and result in more devastating effects. In an effort to reduce the potential for crown fires, ladder fuels would be mechanically treated. After mechanical treatments, the fuels would be removed and treated with prescribed fire or masticated.

Prescribed Burn Areas Outside FRZs

In support of the objectives of FRZs and as stand-alone fuel treatments, a series of 11 underburn areas are proposed on primarily southerly aspects in the Assessment Area. Within these 11 areas, it is anticipated that there would be areas where mechanical pre-treatment could mitigate concentrations of dense vegetation and areas of heavy ground fuels loading. Pre-treatment would give fire managers better options for meeting underburn objectives. The initial size and locations of these areas were based on field review and fire modeling using FlamMap and Farsite fire behavior modeling software.

Approximately 17,808 acres in the 11 prescribed burn areas are proposed throughout the Eddy Gulch LSR Project Assessment Area (see Table B-4 and Maps A-6a and A-6b). Within the 17,808

acres of prescribed burn areas, there are approximately 1,254 acres of plantations, 5,960 acres of Riparian Reserves, and 1,123 acres along roads.

Basis for Locating Prescribed Burn Areas. The ID Team considered the following questions when designing prescribed burn treatments:

- Based on FlamMap and Farsite fire behavior modeling using 90th percentile weather, would construction of FRZs alone accomplish the three project objectives?
- How could the Eddy Gulch LSR best be protected from fires originating from outside the LSR?
- How could the Eddy Gulch LSR best be protected from fires originating from within the LSR?
- Could late-successional characteristics and habitats be protected and developed using treatments limited to ridge tops and buffers around property infrastructures and roads?
- How could fuels treatments best be accomplished on steep inaccessible ground with minimal impacts to the natural resources?

Follow-up Treatments

- After mechanical and underburn treatments, the areas should be monitored, and follow-up treatments employed if monitoring shows a need for secondary and possible maintenance treatments.
- NSO Habitat Protection and Development Areas: Underburning may include mechanical or hand thinning as a pre-treatment where required for safety or habitat protection. Implementation of underburns would comply with guidelines contained in the 1995 Klamath National Forest Land and Resource Management Plan.

1.3.6 TEMPORARY ROAD CONSTRUCTION

Approximately 4.5 miles of temporary roads are proposed in order to provide access to 14 mechanical treatment areas. Table B-6 shows that treatments would occur on approximately 885 acres if the temporary roads were built; without construction of temporary roads, approximately 542 acres would be treated. Maps A-6a and A-6b show the locations of the proposed temporary roads in relation to the mechanical treatment areas.