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Region

Shasta-Trinity
National Forest

South Fork
Management Unit

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Gemmill Thin Project

Draft Environmental Impact Statement



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Gemmill Thin Project Draft Environmental Impact Statement

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Abstract: The environmental impact statement considers three alternatives in detail. Alternative 1, the proposed action, was designed to reduce fuels and support the development of contiguous high quality late-successional and old growth habitat in the Chanchellula Late-Successional Reserve. The project was also designed to conduct fuels reduction activities in wildland interface and intermix areas adjacent to the rural community of Wildwood, California.

The proposed action, summarized below, encompasses a total of 1,618 acres.

- Thinning from below on approximately 1,279 acres of mixed conifer forest, which includes 300 acres of thinning within Riparian Reserve land allocation.
- Thinning from below on approximately 268 acres of mixed conifer forest to reconstruct a 30-year old ridgetop shaded fuelbreak.
- Thinning 20-year old plantations including mastication and/or biomass removal on approximately 44 acres.
- Fuels hazard reduction on approximately 27 acres of mid-slope fuel buffers adjacent to private land. Remove and pile by hand all snags \leq 19 inches in diameter and dead ground fuels for burning.
- Logging systems include: Tractor: 1266 acres, Cable: 142 acres, Helicopter: 139 acres.

Alternative 3 was designed to meet these same goals as the proposed action but includes a defined limit on the maximum size tree that can be harvested (18 inches DBH).¹ Alternative 3 encompasses a total of 1,462 acres, does not include helicopter logging, and has 17 fewer acres of cable logging. Both actions

¹ Diameter at breast height (DBH)

alternatives include additional post harvest fuels reduction in thinning units accomplished by piling and burning, mastication, and/or biomass removal. Road-related activities are also the same for both action alternatives; approximately 23.6 miles of road reconstruction, 1.7 miles of temporary road, and 12.1 miles of road decommissioning is proposed. There would be no new system road construction. Alternative 2 is the no action alternative. The analysis of the no action alternative provides reviewers a baseline to compare the magnitude of environmental effects of the action alternatives.

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decision-making process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. *City of Angoon v. Hodel* (9th Circuit, 1986) and *Wisconsin Heritages, Inc. v. Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

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Date Comments Must Be Received: **The opportunity to comment ends 45 days after the notice of availability (NOA) is published in the Federal Register.**

Summary

The project area is located on the Shasta-Trinity National Forest within Upper Hayfork Creek Watershed, to the east and directly adjacent to the rural community of Wildwood, California. Wildwood is listed in the Federal Register as a Community at Risk, an urban interface community within the vicinity of Federal lands that are at high risk from wildfire. The project area is approximately 4,790 acres of the 26,389 Late-Successional Reserve (LSR) identified as RC331- Chanchellula. Dominant vegetation in the project area is mid-successional Douglas fir overstory, with mixed conifer and hardwood understory. The proposed action would treat approximately 1,618 acres within the project area.

Late-Successional Reserve - Management Objectives _____

The project area is mostly within Late-Successional Reserve (LSR), as designated by the Forest Plan. Management objectives within LSR are to maintain, protect, and enhance conditions of late-successional forest ecosystems. Protection includes reducing the risk of large-scale disturbances, including stand-replacing wildfires. In the Forest-wide LSR Assessment² it states that LSR lands are at elevated risk to large-scale disturbance due to changes in the characteristics and distribution of the mixed-conifer forests resulting from past fire suppression. That assessment also encourages the development of fuels reduction projects as long as they are consistent with the overall recommendations for LSR management. Management activities are focused on reducing the amount of fine fuels, associated rate-of-spread, and flame lengths.

Wildland Urban Interface (WUI) - Management Objectives _____

The National Fire Plan prioritizes fuel treatments near Communities at Risk (CARs). CARs are listed in the Federal Register as urban interface communities within the vicinity of federal lands that are at high risk from wildfire. Wildwood was listed in the Federal Register³ as a CAR. Approximately 3,058 acres of the project area is within the designated Wildwood WUI, with the community itself directly adjacent to the southwest of the project. Additionally, the eastern project boundary is parallel to the Platina WUI boundary, with the community of Platina approximately 7 air miles to the east.

There are three categories of communities that meet the description of WUI. Generally, Federal agencies are to focus treatments on communities that are described under categories 1 and 2. The rural community of Wildwood would fit under the category 2: an intermix community. This is where structures are scattered throughout a wildland area. An alternate definition for intermix community emphasizes a population density of between 28 to 250 persons per square mile. The National Fire Plan directs Federal agencies to conduct fuels reduction activities in wildland interface and intermix areas, as is proposed with this project.

² USDA Forest Service (1999)

³ August 17, 2001

Existing Condition

Field reviews in the project area show that overcrowded forest conditions are affecting the long-term health and maintenance of functional mature and old growth mixed conifer habitat. In the mature conifer stands proposed for treatment, older overstory trees are beginning to die at an accelerated rate and the stagnated, shade-tolerant understory will not provide similar replacement trees. Currently many smaller trees are competing among themselves and with larger trees for limited amounts of water, nutrients and sunlight. Without treatments, these overstocked stands will continue to exhibit an increase in mortality and a decline in development towards old-growth conditions. Stands proposed for treatment are not likely to reach desired conditions without purposeful management intervention.

Overall average fuel loading for the area is in excess of 40 tons-per-acre, with most of the tonnage in the smaller size classes. Fire and Fuels Managers consider fuel loadings in these ranges to be high, and along with the accumulation of smaller trees that act as fuel ladders, there is increased likelihood of future large and destructive wildfires that are dangerous and costly to suppress. During summer months, a wildfire start in these stands could easily transition into a crown fire, resulting in a large stand replacement type fire.

Purpose and Need

The need for action was determined by comparing existing conditions in the field with the desired future condition as described in the Forest Plan for the Wildwood Management Area.⁴ Existing conditions were identified from extensive field review, computer modeling of fuels reduction treatments and wildfire behavior/effects, and interdisciplinary planning.

The two major aspects of the purpose and need for this project are defined as:

1. Reduce risk of habitat loss due to fire and;
2. Accelerate development of late-successional habitat.

Proposed Action

The proposed action, summarized below, encompasses a total of 1,618 acres.

- Thinning from below on approximately 1,279 acres of mixed conifer forest, which includes 300 acres of thinning within Riparian Reserve land allocation.
- Thinning from below on approximately 268 acres of mixed conifer forest to reconstruct a 30-year old ridgetop shaded fuelbreak.
- Thinning 20-year old plantations including mastication and/or biomass removal on approximately 44 acres.
- Fuels hazard reduction on approximately 27 acres of mid-slope fuel buffers adjacent to private land. Remove and pile by hand all snags \leq 19 inches in diameter and dead ground fuels for burning.

⁴ Wildwood Management Area is discussed on Forest Plan, pages 4-165 through 4-168.

- Logging systems include: Tractor: 1266 acres, Cable: 142 acres, Helicopter: 139 acres.
- Road-related activities include approximately 23.6 miles of road reconstruction, 1.7 miles of temporary road, and 12.1 miles of road decommissioning. There will be no new system road construction.
- Post harvest fuels reduction in thinning units accomplished by piling and burning, mastication, and/or biomass removal.

In all thinning units, the largest, oldest dominant trees will be prioritized for protection. The proposed thinning targets the competing understory trees that surround the larger, dominant trees. The project will retain all viable hardwoods (i.e., those with a reasonable chance of surviving successfully after thinning treatments), and would not allow harvest of trees over 150 years old.

Issues and Alternatives Considered

The Forest Service initiated public involvement for the project in 2005, and again in June 2007. The project has been listed on the Forest Schedule of Proposed Actions (SOPA) since 2005, and a public meeting was advertised and held to provide project information and receive public comment. Through scoping the Responsible Official determined there was sufficient public concern over the issue of removing larger trees from Late-Successional Reserve to reasonably warrant comprehensive environmental analysis and disclosure of another action alternative. Alternative 3 was developed in response to this issue and sets 18 inches DBH⁵ as the maximum size tree that can be removed by the project. The analysis of Alternative 3 helps to determine if the identified purpose and need for the project can still be achieved while ensuring retention of all trees over 18 inches DBH.

This environmental impact statement discloses the effects of three alternatives; no action (Alternative 2), the proposed action (Alternative 1), and diameter limit (Alternative 3). With no action, none of the proposed management activities would be implemented at this time. In general, conditions would remain as described in the affected environment section of this document. The analysis of the no action alternative provides reviewers a baseline to compare the magnitude of environmental effects of the action alternatives. Alternative 3 is similar to the proposed action except that 18 inches DBH is defined as the maximum size tree that can be harvested. Alternative 3 does not include helicopter logging (Alternative 1 has 139 acres), and Alternative 3 has 17 fewer acres of cable logging. Alternative 3 encompasses a total of 1,462 acres. Both action alternatives include additional post harvest fuels reduction in thinning units accomplished by piling and burning, mastication, and/or biomass removal. Road-related activities are the same as with Alternative 1.

Conclusions

The interdisciplinary analysis concluded that the project is likely to reduce the risk of stand-replacing wildfire, improve the ability of residual forest stands to withstand drought conditions and insect infestations, and improve conditions for the development of high quality old growth habitat in the project

⁵ Diameter at breast height (DBH)

area. The proposed maintenance of existing shaded fuelbreak will improve its effectiveness as a fire suppression tool and safety area for firefighters. In plantations the project would accelerate growth and the development of late-successional habitat conditions; treated plantations are likely to develop into northern spotted owl connectivity habitat in approximately 10 years (as compared to over 35 years with no action).

The proposed thinning from below was developed as a balance between the maintenance of sufficient canopy for wildlife species, and a reduction in existing and future fuels to prevent loss of habitat due to wildfire. Direct effects to wildlife species will be minimized and avoided during the breeding season through use of limited operating periods. The resulting post-treatment stand-level canopy closure will be about 75% (includes approximately 15% hardwood contribution). Effects to existing late-successional habitat include a short-term reduction in canopy closure, reduction in vertical structure, and reduction in small diameter snags and logs. The project is designed to retain the largest trees, all snags (over 19 inches DBH), large woody debris, and viable hardwoods; all which are key components of high quality late-successional habitat. Project-level analyses of watershed condition and water quality concluded that ground disturbance associated with the project may result in localized increases in suspended sediment during the first few precipitation runoff events following project activities. The geographic extent of potential impacts are moderate, immediately offsite, and do not translate to watershed scale impacts. The project would not result in cumulative watershed effects that threaten long-term water quality objectives.

Decision

The Forest Supervisor will decide whether to implement the proposed action, implement another action alternative that meets the identified purpose and need, or take no action at this time. The decision includes a non-significant Forest Plan amendment that permits removal of trees older than 80 years from LSR. The Forest Service Regional Ecosystem Office has reviewed, and approved of, this Forest Plan amendment to allow removal of trees between 80 and 150 years old from LSR, as recorded in the STNF Late-Successional Reserve Assessment and transmittal letter in 1999. The proposed amendment to modify the Forest Plan (Forest Plan, page 4-37) “Guidelines to Reduce Risks of Large-Scale Disturbance” for the Gemmill Thin Project is described further in Appendix I of the environmental impact statement.

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Chapter 1: Purpose of and Need for Action

Document Structure

The Forest Service has prepared this Draft Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Impact Statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized as follows:

Chapter 1. Purpose and Need for Action: This chapter includes an introduction to the project proposal, the purpose of and need for the project, and the agency’s proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Chapter 2. Alternatives: This chapter provides a more detailed description of the agency’s proposed action as well an alternative method for achieving the stated purpose. The alternative proposal was developed based on significant issues raised by the public and other agencies. The agency’s proposed action and the alternative proposal include resource protection measures to avoid or mitigate potential impacts. Finally, this chapter provides a summary table of the environmental consequences associated with each alternative.

Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the existing condition of the project area and the environmental effects of implementing the proposed action and other alternatives.

Chapter 4. Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the Draft Environmental Impact Statement.

Appendices: The appendices provide more detailed information to support the analyses presented in the Environmental Impact Statement.

Index: The index provides page numbers by document topic.

Literature Cited: Cited references are listed at the end of each chapter.

Footnotes are used throughout the document to provide clarification, further information, or in reference to scientific literature, management direction documents or other project record documents.

Introduction

The Shasta-Trinity National Forest (STNF) is responsible for implementing vegetation management projects that will help reduce the risk of stand-replacing wildfire and sustain or improve the overall health and resiliency of the forest.⁶ The goal of this type of management is to provide sustainable forests including high quality late-successional wildlife habitat as a legacy for future generations. The Gemmill

⁶ The Shasta-Trinity National Forest Land and Resource Management Plan (Forest Plan), the guiding document for management of the Forest provides more details and is available online at <http://www.fs.fed.us/r5/shastatrinity/publications/>

Thin Project is located on the South Fork Management Unit where fuels reduction and forest health projects have been occurring for more than 15 years. Projects have been developed to reduce the threat of wildfire within wildland-urban interface areas and to address other resource restoration priorities. The project is partially within the wildland-urban interface (WUI) surrounding the rural community of Wildwood, which is listed in the Federal Register as a high risk fire area. As part of the National Fire Plan, Federal agencies conduct fuels reduction in and around WUI to reduce the risk of catastrophic wildfire to people, communities, and natural resources while restoring forest ecosystems to more closely match their historical characteristics.⁷

This project was developed in order to reduce the intensity and size of future wildfires, and to maintain/improve ecosystem function and wildlife habitat in the Chanchellula Late-Successional Reserve. Fuels reduction on the STNF initially occurred in WUI and within areas allocated by the STNF Land and Resource Management Plan (Forest Plan; USDA-FS, 1995) as general forest to be managed for multiple-use including commercial wood products, recreation, and wildlife habitat. The Gemmill Thin Project is one of the first STNF fuels reduction projects proposed within the forest allocation known as Late-Successional Reserve (LSR). LSR is managed to protect and enhance late-successional and old growth⁸ forest ecosystems which provide habitat for late-successional associated wildlife species like the northern spotted owl.⁹ In 1999 the STNF published a Forest-wide assessment of LSR condition.¹⁰ This assessment stressed the need for forest management intervention in LSR to address existing fuel hazards and overstocked conditions¹¹ which threaten valuable resources including existing and developing late-successional habitat and water quality. In response to these management needs the Gemmill Thin Project was created to reduce fire risk and improve the development and sustainability of forests and wildlife habitat in the Chanchellula LSR.

The overcrowded conditions in mature forest stands of the Chanchellula LSR are causing a delay in the establishment of healthy, functioning old growth habitat and putting the largest and oldest trees at risk to mortality due to the proximity and number of competing trees. Tree vigor is currently reduced because smaller trees are competing with larger trees for limited amounts of nutrients, sunlight, and especially water. This leaves the ecosystem more prone to disease and less resilient to fire. Without treatment, overstocked stands will not remain healthy or meet the need for more old growth habitat in the LSR. Most of the existing plantations scattered throughout the LSR have never been thinned so they too are overcrowded and are hindered in their development of future old growth habitat characteristics. The project is designed to support the development of contiguous high quality late-successional and old growth habitat that is resilient to wildfire and other disturbances.

⁷ More information on the National Fire Plan is online at <http://www.forestsandrangelands.gov/NFP/overview.shtml>

⁸ Definitions for late-successional and old growth are in Wildlife Chapter 3 and Glossary Appendix B.

⁹ Management direction for LSR land allocation is discussed in Forest Plan, pages 4-37 through 4-44.

¹⁰ USDA-FS (1999)

¹¹ Overstocked means that reaching late-successional conditions will be substantially delayed or prevented, or desirable components of the stand will likely be eliminated, because of stocking levels (USDA-FS, 1999).

Location and Land Allocation

The project area is located northeast of the community of Wildwood, California and south of the Chanchellula Wilderness. It is within the Upper Hayfork Creek Watershed, legal location is T.29 and 30 N., R.10 and 11 W., Mt. Diablo Meridian. The project is partially within WUI surrounding the rural community of Wildwood. Wildwood is listed in the Federal Register¹² as a high-risk fire area, and is

classified as “intermix community.” Intermix communities have structures that are scattered throughout a wildland area, and wildland fuels are continuous both outside and within the community development. The National Fire Plan directs Federal agencies to conduct fuels reduction activities in wildland interface and intermix areas, as is proposed with this project.

The Gemmill Thin Project encompasses a total of approximately 1,618 acres of Shasta-Trinity National Forest System land. Most of the project area is allocated by the Forest Plan as Late-Successional Reserve (Chanchellula LSR RC-331). There are 300 acres within project units that are allocated as Riparian Reserve and a few ridgetop acres in the project are allocated as Matrix. The project area is also mostly

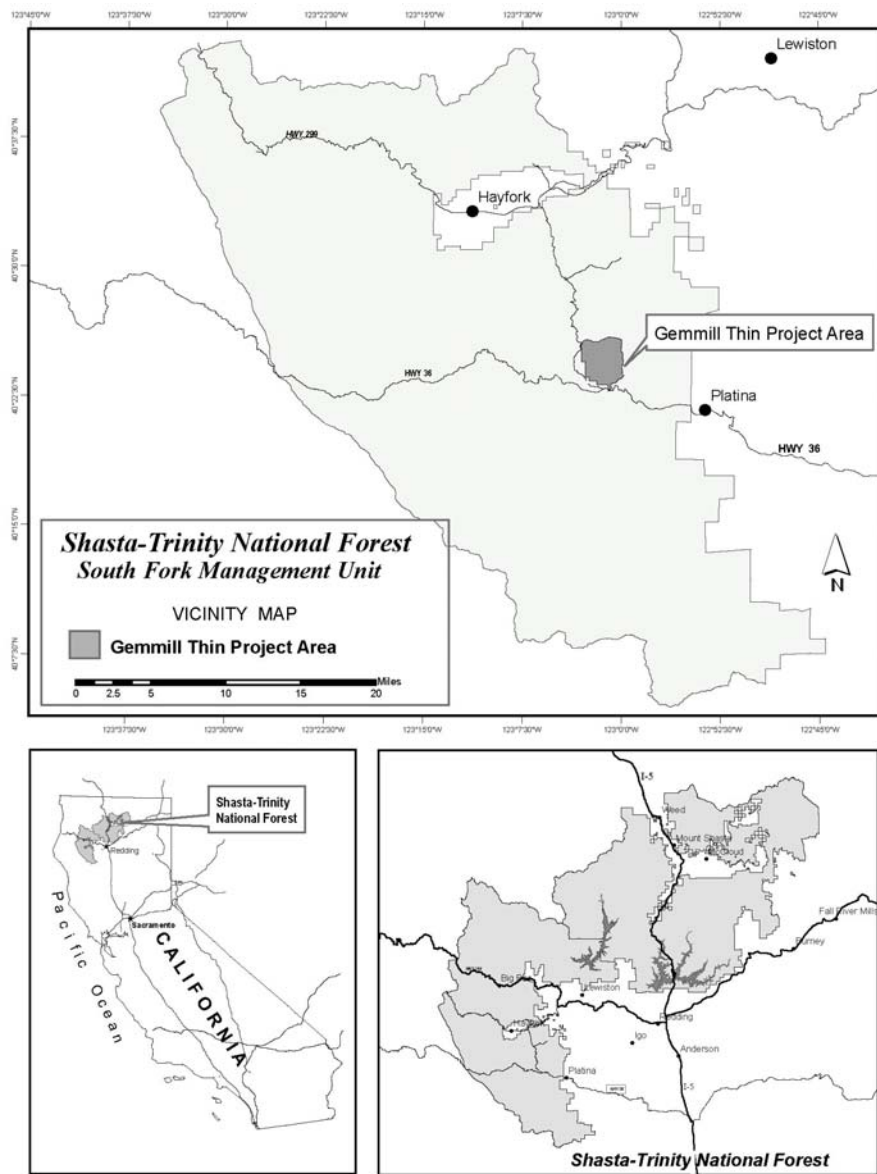


Figure 1-1: Project Location Maps

within Endangered Species Act-designated critical habitat for the northern spotted owl.

¹² FR Vol. 66, No. 3, Thursday, January 4, 2001

Purpose and Need

The need for action was determined by comparing existing conditions in the field with the desired future condition as described in the Forest Plan for the Wildwood Management Area.¹³ Existing conditions were identified from extensive field review, computer modeling of fuels reduction treatments and wildfire behavior/effects, and interdisciplinary planning. The interdisciplinary team identified several resource conditions where the desired conditions described in the Forest Plan differ from the existing condition. The following existing conditions, with associated management goals listed below, describe the purpose and need and are the basis for the proposed action:

- Excessive fuel accumulations and fuel ladders
 - Reduce the risk of losing existing and developing late-successional habitat due to wildfire.
 - Restore the use of fire as a tool to maintain lower fuel loading.
- Insufficient amount of late-successional habitat
 - Encourage or accelerate the development of contiguous late-successional and old growth habitat.

Therefore, the two major aspects of the purpose and need for this project are defined as:

1. Reduce risk of habitat loss due to fire and;
2. Accelerate development of late-successional habitat.

The following section discusses more detailed existing and desired condition information for each of these two aspects of the purpose and need.

Reduce risk of habitat loss due to fire

Within the project area and surrounding landscape the greatest threat to loss and degradation of habitat for late-successional associated species is wildfire.¹⁴ The exclusion of fire over the past 100-150 years has led to a marked accumulation of fuel, and increases in tree damage and mortality due to wind as well as insect and disease attacks. The proposed project is designed to reduce accumulated ground and ladder fuels, improve forest health and resiliency, and protect existing late-successional habitat while encouraging growth in younger mixed conifer stands. Post-wildfire effects monitoring in areas that were treated for hazardous fuels reduction prior to a wildfire support the widely-held belief among fuels specialists that fuels reduction treatments, like those proposed in this project, are effective in reducing the extreme fire behavior that leads to stand-replacing wildfires.¹⁵

Existing Condition

The majority of the project is proposed in natural stands of mixed conifer, with white and Douglas fir in the understory. The overstory canopy is comprised of Douglas fir, along with scattered large predominant sugar pine and ponderosa pine trees. The understory layer is crowded with shade-growing, fire-

¹³ Wildwood Management Area is discussed on Forest Plan, pages 4-165 through 4-168.

¹⁴ USDA-FS (1999), page 4-1

¹⁵ See Murphy et al. (2007), Agee & Skinner (2005), and Strom & Fule (2007)

susceptible vegetation because naturally occurring wildfire has been largely eliminated for over 100 years. The historic, pre-1850s, fire regime for the project area and the surrounding landscape was one of fairly frequent low to moderate intensity fires. These fires regulated fuels accumulation and determined forest structure.¹⁶ The current fire regime is composed of infrequent (every 25-100 years) moderate-severity partial stand-replacement fires, which includes areas of high and low severity. Human caused wildfire in the project area is a concern due to existing transmission lines and a State highway; humans have caused several past large wildfires in the area.

The past more intensive timber harvest practices that were implemented during 1950-1990 also created large openings where vegetation has returned resulting in dense, overstocked conditions. There are a number of plantations in the project area and they are generally single-storied and currently overstocked with approximately 350-500 trees per acre. They are mostly even-aged and originated in the mid 1980s through artificial regeneration after the Wilson Point Timber Sale. Plantations proposed for treatment are losing vigor and becoming increasingly susceptible to mortality from insect and disease. These plantations were selected for treatment because of their high fire risk, location and close proximity to older stands that would be susceptible to fire, and existing vegetation characteristics which make them suitable for mechanical fuels reduction treatment (mastication or biomass removal).

Current forest loss due to insect and disease is moderate over the entire LSR, with pockets of high mortality observed in older plantations. Mortality and top dieback are common in overstory trees and exacerbated by increasing competition stress from smaller trees. Mortality in sugar and ponderosa pine is disproportionately high.¹⁷ The dead-down and live ground fuels 3 inches in diameter and less is approximately 12 tons per acre. Dead fuel loading of ¼ inch diameter and smaller is approximately 3 tons per acre, live fuels foliage is around 2 tons per acre, and the fuel bed depth is approximately 1 foot deep.¹⁸ Results of project-level Behave fuel modeling indicate that flame lengths greater than 12 feet can be expected during future wildfire. Analyses of existing condition as it relates to fuels and wildfire conclude that stands in the project area are at elevated risk of being lost due to future wildfire.

Desired Condition

Desired conditions for the project area include a natural landscape with much of the area containing late-successional forest vegetation that has an increased resiliency to fire events.¹⁹ Stand understories appear more open with less ingrowth particularly in stands on sites where wildfire plays a key role in stand development.²⁰ Desired condition for ground fuel loading of dead and live fuels 3 inches in diameter and smaller is 5 tons per acre, or less (compared to the existing 12 tons per acre). Finer fuels (¼ inch diameter and smaller) should average 1.5 tons per acre (compared to the existing 3 tons per acre). Flame lengths

¹⁶ Taylor & Skinner (1998)

¹⁷ See description of Chanchellula LSR in LSR Assessment (USDA-FS, 1999).

¹⁸ Estimates from Behave fuels modeling described in Chapter 3 - Fuels

¹⁹ See USDA-FS (1999), page 3-2

²⁰ Forest Plan, page 4-166

during wildfires should not to exceed 4 feet,²¹ and fire can be utilized to maintain lower levels of fuel loading.

For plantations, stands need to be kept healthy and fast-growing with stocking levels and fuel accumulations at levels that reduce the likelihood of loss to catastrophic fire and improve the growth of large trees.²² Plantations in the project area would be stocked with roughly 130 well-spaced trees per acre. General tree mortality in the project area should be low, and more near historic endemic levels, for shade-intolerant species such as sugar and ponderosa pine.

Accelerate development of late-successional habitat

The LSR Assessment also cites the need for treatments in Chanchellula LSR to increase the amount of late-successional habitat and promote connectivity of late-successional habitat. Criteria used to determine this need were: areas of early and mid successional forest adjacent to isolated stands of late-successional habitat that will respond to treatment, and areas of early and mid successional forest that coincide with landscape features that may be important to dispersing animals (i.e. riparian areas and within saddles).²³ The project is designed to provide conditions known to increase tree growth, therefore it would likely decrease the time needed for younger stands to develop into late-successional habitat. Proposed activities in plantations are designed to provide habitat that provides connectivity between blocks of older late-successional forest.

Existing Condition

During the late 1800s significant portions of the Chanchellula LSR were intensively burned by wildfires, and mid-successional forests resulting from this disturbance make up most of the LSR (approximately 60%).²⁴ Field reviews in the project area show that overcrowded forest conditions are affecting the long-term health and maintenance of functional mature and old growth mixed conifer habitat. In the mature conifer stands proposed for treatment, older overstory trees are beginning to die at an accelerated rate and the stagnated, shade-tolerant understory will not provide similar replacement trees. The LSR Assessment²⁵ describes existing conditions in the Chanchellula LSR and cites the need to thin existing dense stands to protect them against increasing mortality and improve conditions for development of late-successional habitat. Currently many smaller trees are competing among themselves and with larger trees for limited amounts of water, nutrients and sunlight. Without treatments, these overstocked stands will continue to exhibit an increase in mortality and a decline in development towards old-growth conditions. Stands proposed for treatment are not likely to reach desired conditions without purposeful management intervention.

²¹ See USDA-FS (1999), page 4-16

²² See USDA-FS (1999), page 3-1

²³ See USDA-FS (1999), page 4-5

²⁴ USDA-FS (1999), page 2-34

²⁵ USDA-FS (1999), page 2-34

Current basal area within thinning units ranges from 150-350 square feet per acre.²⁶ Plantations are currently overstocked with approximately 350-500 trees per acre. Without management intervention, plantations would remain too dense to function as connectivity habitat for northern spotted owls for at least 35 years.²⁷

Desired Condition

Existing late-successional habitat within and adjacent to the project area is connected for use by wildlife, and future habitat (younger forest) is managed to encourage development of contiguous old growth habitat. Late-successional forests are managed to maintain health and diversity components through the use of prescribed fire and thinning from below.²⁸ Patches of dead trees and snags 10 acres or less in size are retained, and younger mature forest stands are managed to replace older, dying stands. Dead and dying trees and snags are retained at considerably higher levels in LSR than within other land allocations therefore large snags, hardwoods, and down logs are desired components that are retained during vegetation management projects.

In terms of tree stocking density, lower basal areas (in the range of 140-180 square feet per acre) would be maintained to maintain or improve stand health and minimize mortality. In general, densities are maintained at lower levels in LSR to maximize growth of larger old trees.²⁹ Plantation stands should be maintained as healthy and fast-growing with stocking levels and fuel accumulations at levels that reduce the likelihood of loss to catastrophic fire and encourage the growth of large trees.³⁰ Desired stocking levels for plantations are approximately 150 trees per acre, and a goal of plantation management is to provide at least connectivity habitat for northern spotted owls.³¹

Proposed Action Summary

The proposed action, summarized below, is described in detail in Chapter 2 and displayed in Appendix A, Map 3. The project encompasses a total of 1,618 acres.

- Thinning from below on approximately 1,279 acres of mixed conifer forest, which includes 300 acres of thinning within Riparian Reserve land allocation.
- Thinning from below on approximately 268 acres of mixed conifer forest to reconstruct a 30-year old ridgetop fuelbreak.
- Thinning 20-year old plantations including mastication and/or biomass removal on approximately 44 acres.
- Fuels hazard reduction on approximately 27 acres of mid-slope fuel buffers adjacent to private land. Remove and pile by hand all snags \leq 19 inches in diameter and dead ground fuels for burning.

²⁶ Basal area is used to measure tree stocking (or stocking density), for more detail see Chapter 3 - Vegetation

²⁷ See project Wildlife Biological Assessment, Appendix G, page 15

²⁸ Forest Plan, page 4-166

²⁹ Forest Plan, page 4-166

³⁰ USDA-FS (1999), page 3-1

³¹ The project would accelerate the development of connectivity habitat for the northern spotted owl within the project area in approximately 10 years (see Wildlife BA).

In all thinning units the largest, oldest dominant trees will be prioritized for protection. Thinnings will target the competing understory trees that are around the larger, dominant trees. The project will retain all viable hardwoods (i.e., those with a reasonable chance of surviving successfully after thinning treatments), and would not allow harvest of trees over 150 years old.

The project includes post harvest fuels reduction and road-related activities, as described in *Chapter 2 – Alternatives*. More detail on proposed fuels reduction activities is in Appendix D, and road-related connected actions are summarized in Appendix C. There would be no new system road construction with this project.

Decision Framework

The Forest Supervisor will decide whether to implement the proposed action, implement another action alternative that meets the identified purpose and need, or take no action at this time. The proposed action includes a non-significant Forest Plan amendment that permits removal of trees older than 80 years from LSR. The Forest Service Regional Ecosystem Office has reviewed, and approved of, this amendment of the Forest Plan to allow removal of trees between 80 and 150 years old from LSR, as recorded in the STNF Late-Successional Reserve Assessment and transmittal letter in 1999. The proposed amendment to modify the Forest Plan (Forest Plan, page 4-37) “Guidelines to Reduce Risks of Large-Scale Disturbance” for the Gemmill Thin Project is described further in Appendix I.

Management Direction

National Forest Management Direction

National Forest management is guided by various laws, regulations, and policies that provide the framework for all levels of planning. These higher-order documents are incorporated by reference and can be obtained from Forest Service offices or on the web. Direction which guides the project analysis includes: The Multiple-Use Sustained Yield Act of 1960; the National Forest Management Act of 1976 (NFMA); the National Environmental Policy Act of 1969 (NEPA); the National Historic Preservation Act of 1979; the Endangered Species Act of 1973; and the Record of Decision (ROD) for the Final Environmental Impact Statement for the Shasta-Trinity National Forest, 1995 which includes the 1994 ROD for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (a.k.a. the Northwest Forest Plan) and Standards and Guidelines for Management of Habitat for Late-Successional and Old Growth Forest Related Species Within the Range of the Northern Spotted Owl.

Shasta-Trinity NF Forest Land and Resource Management Plan (Forest Plan)

The proposed project is within the Wildwood Management Area. The Forest Plan contains management direction for the Wildwood Management Area on pages 4-165 to 4-168. The Chanchellula LSR makes up 34% of the Management Area, and it is managed to protect and enhance late-successional forest ecosystems. Forest stands in LSR are managed to maintain health and diversity components through the

use of prescribed fire and thinning from below.³² General management direction for LSR lands is found on pages 4-37 to 4-44 of the Forest Plan. Silvicultural activities aimed at reducing risk (potential loss due to wildfire) shall focus on younger stands in LSR.³³ LSR management objectives are to accelerate development of late-successional conditions, while making the future stand less susceptible to disturbance events.

The Forest Plan designates Riparian Reserve on lands adjacent to permanent and intermittent/ephemeral water bodies. This designation overlays the other land allocations, including Late-Successional Reserve; Riparian Reserve are afforded the most protection during management actions as directed in the Forest Plan. Direction for management of Riparian Reserve is found in the Forest Plan, pages 4-53 to 4-60. Generally, the area within 300 feet from both sides of high water level applies to perennial streams, or 150 feet for intermittent/ephemeral streams.³⁴ Management activities may occur in Riparian Reserve when they are in support of, or do not adversely affect, the maintenance of riparian-dependent resources (i.e., fish, wildlife, water). Forest Plan objectives for Riparian Reserve include providing functional aquatic habitat and connecting travel corridors for terrestrial wildlife, particularly for late-successional habitat dependent species. Riparian Reserve management prescriptions emphasize retention and/or enhancement of old-growth vegetation.³⁵ The project was designed to implement the management direction described in the Forest Plan.

Consultation with Other Agencies

The U.S. Fish and Wildlife Service (USFWS) provided input during the original scoping process that was incorporated into design of the proposed action. The USFWS also participated in field review of the project and completed formal consultation with the STNF for the Gemmill Thin Project, ensuring compliance with the Endangered Species Act (ESA). Regarding ESA consultation for fisheries, the STNF utilized the Alternative Consultation Agreement which is further described in Appendix F. In addition, the North Coast Regional Water Quality Control Board, and the California Department of Forestry, provided input to the design of the proposed action.

Public Involvement/ Issue Identification

This project has been listed in the *Shasta-Trinity National Forest Schedule of Proposed Actions* (SOPA) since 2005. Relevant project information was first posted on the Forest website September 19, 2005, and can be found at <http://www.fs.fed.us/r5/shastatrinity/projects/sfmu-projects.shtml>. The STNF sent out the first public correspondence regarding Gemmill Thin in a September 15, 2005 letter introducing the project and inviting public participation at an informative meeting held on September 28, 2005. At this meeting the STNF described the purpose and need and proposed action for the project, and received input

³² Forest Plan, page 4-166

³³ Forest Plan, page 4-37

³⁴ RR within the project area is identified, as directed in the Forest Plan, and marked on the ground before project implementation.

³⁵ Forest Plan, page 4-59

from the public. The Notice of Intent (NOI) to prepare an Environmental Impact Statement for the proposed action was published in the Federal Register (Vol. 70, No. 237) on December 12, 2005. The NOI requested public comment on the proposal from December 12, 2005 to January 13, 2006. It was also printed as a legal notice in both the Record Searchlight (December 14, 2005) and the Trinity Journal (December 21, 2005). The proposed action was presented to the Trinity County Fire Safe Council on April 27, 2006; the Council provided support for the Gemmill Thin and Gemmill Fuels³⁶ projects.

Due to wildfires and changes in the forest program, the Gemmill Thin Project was on hold until May 2007. A revised NOI was published in the Federal Register (Vol. 72, No. 105) on June 1, 2007. This revised NOI requested public comment on the same project proposal from June 1, 2007 to July 2, 2007. Legal notices requesting public comment published in the Record Searchlight on June 8, 2007 and the Trinity Journal on June 13, 2007. A scoping document describing the proposed action was sent to 119 interested and affected citizens, agencies, and tribes on June 11, 2007. Public comments received during both NOI scoping periods (2005 and 2007) were reviewed by the project interdisciplinary team and issues raised were evaluated for significance.³⁷ The Responsible Official determined which issue(s), identified through public scoping, warranted the development of alternatives to the proposed action. Two other alternatives were identified: Alternative 3 and Alternative 4. Alternative 4 was removed from detailed study after preliminary fuels effects analysis showed that it would not meet the purpose and need. The proposed action (Alternative 1), no action (Alternative 2), and an alternative action (Alternative 3) are analyzed and disclosed in this environmental impact statement.

Project-related issues and other information and considerations identified during public scoping, are in Appendix K.

Significant Issues

Through scoping the Responsible Official determined there was sufficient public concern over the issue of removing larger trees from Late-Successional Reserve to reasonably warrant detailed environmental analysis and disclosure of another action alternative. Alternative 3 was developed in response to this issue and sets 18 inches DBH³⁸ as the maximum size tree that can be removed by the project. The interdisciplinary team fully analyzed the effects of Alternative 3, and the results are disclosed in this environmental impact statement. The analysis of Alternative 3 helps to determine if the identified purpose and need for the project can still be achieved while ensuring retention of all trees over 18 inches DBH.

³⁶ Gemmill Fuels is a future foreseeable project in the project area

³⁷ As defined in NEPA (40 CFR 1508)

³⁸ Diameter at breast height (DBH)

Literature Cited – Chapter 1

- Agee, J. K. and C. N. Skinner, 2005. Basic principles of forest fuel reduction treatments. *Forest Ecology and Management* 211: 83-96.
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Chapter 2: Alternatives

Introduction

This chapter describes and compares the alternatives considered for the Gemmill Thin Project. It describes alternatives considered in detail and those eliminated from detailed study. Reasonable alternatives were explored and objectively evaluated as well as those alternatives eliminated from detailed study (40 CFR 1502.14). The end of this chapter summarizes the alternatives along with the associated environmental impacts for each so they can be readily compared.

Alternatives Considered in Detail

Alternative 1: Proposed Action

Following field reviews, and interdisciplinary planning and preliminary effects analysis, Alternative 1 was designed to meet the identified purpose and need for action. The proposed action consists of thinning from below in mixed conifer late-successional stands with associated post-harvest fuel reduction treatments; it also includes other hazardous fuels reduction activities in plantations, fuelbreaks, and fuel buffers.

Table 2-1. Proposed Treatment Summary

Proposed Vegetation Treatment	Acres
Thinning late-successional stands	1,279
Thinning shaded fuelbreaks	268
Thinning plantations	44
Handpile fuel buffers for burning	27

Thinning Late-Successional Stands

Thin from below silviculture harvest prescriptions designed to reduce fire risk and to improve forest resiliency and wildlife habitat, are proposed on approximately 1,279 acres in 33 units (summarized in Appendix D tables). All proposed thinning is within Late-Successional Reserve (LSR), and about 300 acres of Riparian Reserve (RR) within LSR. The project proposes thinning in units of mixed conifer stands that are classified as either late-successional old growth (referred to in this document as old growth), or younger late-successional habitat that currently lack old growth characteristics (referred to as mature).³⁹

Thinning from below is proposed on 751 acres of mature (about 80-100 years old) mixed conifer and hardwood forest, which includes about 180 acres of RR associated with intermittent or ephemeral channels. These stands are classified as late-successional, but do not yet exhibit old growth characteristics although there is potential to attain them in most areas. Thinning from below, using the same harvest prescription, is proposed on 528 acres of old growth mixed conifer and hardwood forest; this includes about 110 acres of RR associated with intermittent or ephemeral channels. These older stands are approximately 100-150 years old and contain areas of high quality old growth habitat as well as younger late-successional stands.

³⁹ Mature and old growth stands are defined in the Northwest Forest Plan and these definitions are provided in Wildlife Chapter 3 and Appendix B Glossary.

In all treatment units, the largest and healthiest trees would be retained, and no trees more than 150 years old will be removed. A sufficient number of trees would be removed to a level that maintains or increases growth rates of dominant trees and removes fuel ladders. Existing canopy closure ranges from 60-90% in project units, and the project would reduce overall canopy closure to approximately 60%. The project would implement a variable density marking technique designed to replicate the natural variation in stand structure and development, providing for richer stand structural complexity and diversity. The project would result in fewer, but healthier trees per acre, and is designed to serve four major purposes: (1) increase the potential future acres of contiguous old-growth habitat (2) increase the development rate of old-growth habitat characteristics in younger stands (3) reduce the loss of existing and developing old-growth habitat in the event of insect/disease outbreaks and wildfire and (4) make it possible to manage lower fuel loading in the future using prescribed fire.

Riparian Reserve

Proposed thinning, as described above, includes a total of approximately 300 acres of RR land allocation areas within LSR. RR proposed for thinning is associated with intermittent or ephemeral stream channels within project units, and where vegetation composition is more representative of upland conditions than perennially-wet riparian zones. The RR areas proposed for treatment are characterized by overstocked mixed conifer stands, and a similar silvicultural prescription described above for late-successional stands applies to timber harvest in RR. Prescriptions for timber harvest in RR retain endemic elements of disease and decadence, including all snags and hardwoods.

RR for the project was designated, as directed by the Forest Plan, to be 150 feet on both sides of intermittent and ephemeral stream channels.⁴⁰ Project activities and equipment are prohibited within inner gorge areas or within 50 feet of the high water mark of channels, activities are proposed only in the most upland portions of RR associated with intermittent or ephemeral channels (the outer 100 feet of the 150-foot wide RR). Canopy closure would be reduced from an estimated 60 to 90%, to an estimated 60%. Deciduous vegetation, including riparian-associated species such as big leaf maple and alder would not be affected by the project. RR are managed to maintain and restore conditions described in the Aquatic Conservation Strategy (ACS) objectives, and the project was designed to be consistent with the ACS.

Post-harvest fuels reduction

The project includes hazardous fuels reduction within all timber harvest units. Post-harvest fuels reduction activities were designed to reduce existing and activity-generated surface fuels to approximately 5 tons per acre and remove potential fuel ladders. Fuel hazard reduction proposed for most late-successional thinning units (approximately 1,103 acres) is referred to as “treat on site” (TOS), which includes the removal, mastication, chipping, or concentration for burning of excess surface fuels. TOS fuels reduction applies to units with relatively flat or gently sloping ground, generally where tractor-based timber harvest systems have been utilized. Where TOS is utilized in RR no tractor piling is permitted, post-harvest activities are limited to handpiling and burning and/or mastication to reduce excess fuels. On

⁴⁰ RR associated with perennial streams is designated as 300 feet from both sides of the channel. The project does not propose thinning, or other fuels reduction activities, within RR associated with perennial streams.

the remaining acres of late-successional thinning units (176 acres), post-harvest fuels reduction will be accomplished by handpiling and burning.

Other Fuels Reduction Activities

Plantations (44 acres)

Selected mixed conifer plantations would also be treated with implementation of the action alternatives. Mixed conifer plantations proposed for treatment were planted in the mid to late 1980s. They are currently densely stocked with mixed conifer and hardwood species. The project includes mechanical thinning and mastication of excess trees and brush in mixed conifer plantations on an estimated 44 acres. Excess biomass may need to be removed in order to achieve post project fuels objectives, otherwise it will be masticated or pile burned on site. Residual tree stocking would be reduced from an estimated 500 to 900 trees per acre to an estimated 130 trees per acre. All viable hardwoods will be retained. Proposed thinning and fuels reduction would serve two purposes: (1) increase the rate of development and (2) reduce the loss of existing plantations in the event of wildfire and insect and disease attacks.

Shaded Fuelbreak Maintenance (268 acres)

The project proposes maintaining and restoring an existing fuelbreak around the perimeter of the project area to provide safe accessibility for fire suppression, which provides protection for existing late-successional and old growth habitat in the LSR during wildfires. The existing fuelbreak proposed for maintenance is approximately 30 years old, and contains ridge-top mixed conifer stands approximately 80-150 years old. The fuelbreak is approximately 150-300 feet wide, and is designed to provide an effective control point for future wildfire.⁴¹ Currently overstory canopy cover in the fuelbreak is increasing and closing, and understory vegetation has developed into potential fuel ladders. These are not desirable characteristics for maintaining a functional fuelbreak. The project would restore functionality of this shaded fuelbreak by removing most understory vegetation and retaining approximately 40% canopy closure (reduced from current 50-70%).

Fuel Buffers (27 acres)

Fuel buffer areas were selected for treatment because of their location (along property line), and existing accumulation of surface hazardous fuels. These are stands that have experienced a high level of tree mortality due to insect, disease and windthrow; the resulting fuel loading puts these, and adjacent private timber stands, at a high risk of being lost to crown fire. Small dead trees (snags less than 19 inches diameter) and ground fuels would be concentrated for burning using hand treatment methods. All live trees would be retained.

⁴¹ The fuelbreak proposed for maintenance was used successfully in 1980 to control a human-caused wildfire started near State Highway 36.

Connected Actions

Landings

Up to an estimated 31 temporary landings would be constructed, each measuring roughly 100x100 feet to 100x200 feet, and an additional 23 existing landings would be reused. Landings are critical for handling and storing the substantial amount of woody material that would be produced by the removal of large numbers of relatively small diameter trees and dead fuel within project units. No trees greater than 24 inches diameter at breast height (DBH) would be cut to create landings. The landings would be decompacted to facilitate water infiltration and natural revegetation following the proposed thinning and fuels reduction. Map 4 in Appendix A displays likely landing locations based upon intensive field reviews, topography, stand conditions and experience with where landings may be needed. The interdisciplinary team chose to utilize a higher number of small landings versus fewer large landings because this allows for strategically placing landings to avoid or minimize impacts to the largest/oldest trees and minimizes the ground disturbing effects of dragging logs long distances. New landings will not be constructed within RR. Landings that currently exist in RR will be reused where reuse constitutes less ground disturbance than new construction.

Roads

There would be no new system road construction, and no trees over 24 inches DBH will be removed due to road-related project activities. An estimated 23.6 miles of system road would be reconstructed to reduce or eliminate potential road-related impacts of the project. About 12.1 miles of road would be decommissioned after completion of project activities. An estimated 1.7 miles of temporary road would be constructed within project units to aid in tree removal, and ripped and closed after completion of project activities (temporary road would be built, used and removed in the same dry season). One rock pit would be expanded to provide source material for road reconstruction activities. See Appendix C for a detailed description of each road.

Table 2-2. Road Summary

Proposed Road Treatment	Miles	# of Road Segments
Decommission system/nonsystem roads	12.1	26
System road reconstruction	23.6	13
Temporary road construction/decom	1.7	NA
New system road construction	0.0	NA

Road reconstruction consists of several (or all) of the following actions: blading and shaping of

the travel way, drainage improvement including pipe installation (size culverts to Q100 flood event), waterbars, and/or rolling dips, overside drain where necessary, and rocking for surface protection.

Road decommissioning entails removing culverts, ripping and outslipping road surface, and closure. The goal is to control surface runoff, erosion, and mass failure, and to make the road unavailable for future use. The condition of decommissioned roads is monitored long-term as a function of Best Management Practices (BMP) effectiveness monitoring. Decommissioned roads and landings would be seeded with native grass seed mixed with non-persistent cereal grains. Certified weed-free straw would be

spread on all decommissioned roads and landings, and heavily disturbed skid trails. In areas where service access is required, but soils are seasonally saturated and road use would cause rutting, soil compaction, damage to the roots of trees, as well as wildlife disturbance during critical periods, roads will be closed year around.

Alternative 2: No Action

This alternative would result in none of the proposed management activities being implemented within the project area at this time. Conditions would remain as described in the affected environment section of this document. The analysis of the no action alternative provides reviewers a baseline to compare the magnitude of environmental effects of the action alternatives.

Alternative 3: Diameter limit-18 inches

Alternative 3 was designed in response to public scoping comments (summarized in Appendix K). Public concern over removing larger trees from Late-Successional Reserves was considered significant because the STNF Forest Plan and Northwest Forest Plan, both which guide land management in the project area, emphasize the importance of protecting all late-successional habitat in these areas. The proposed action (Alternative 1) was designed to maintain existing late-successional habitat and to encourage development of additional late-successional habitat while minimizing short-term impacts; it was also designed to protect existing high quality old growth habitat from the effects of future wildfire. As discussed in the Forest Plan and the 1999 LSR Assessment, larger trees may be harvested in LSR in order to achieve management objectives for developing and/or maintaining late-successional forest. However, in order to fully evaluate if the identified purpose and need for the project can be reasonably achieved while placing a strict limit on the size of trees harvested, the interdisciplinary team analyzed Alternative 3.

Alternative 3 also proposes thinning from below in mature mixed conifer stands as described above for the proposed action; the main difference between the two alternatives is that Alternative 3 defines 18 inches DBH as the maximum size tree that can be harvested. Trees over this size may be harvested with the proposed action when they are in direct competition with a larger, more dominant tree. Because of accessibility and safety concerns, units proposed for helicopter logging in the proposed action (units 9, 11, and 12) are not part of Alternative 3; therefore 139 fewer acres will be treated with Alternative 3. Also, there would be 17 fewer acres of cable logging with Alternative 3, as compared to Alternative 1. Fuelbreak maintenance activities will be modified for Alternative 3 as well; due to the diameter limit, less understory vegetation will be removed from some areas of the fuelbreak. Connected actions and resource protection measures are the same for Alternative 1 and Alternative 3.

Alternatives Considered But Eliminated From Detailed Study _____

One alternative was developed in response to scoping comments, then later eliminated from detailed consideration (*Alternative 4-Diameter Limit 12 inches*). This alternative is comparable to Alternative 3, but proposes a 12 inch DBH limit for maximum tree size to be treated. With implementation of Alternative 4, no trees greater than 12 inches diameter breast height (DBH) would be harvested.

Alternative 4 was eliminated from detailed study because preliminary effects analysis showed that it does not respond to the identified purpose and need to reduce fuels and support the development of high quality late-successional old growth habitat. Vegetation and fuels modeling indicated no substantive growth response would result from implementation of Alternative 4, and fuels reduction objectives could not be achieved.⁴²

Resource Protection Measures

The following protective measures, designed to reduce or eliminate potential project effects, are common to Alternatives 1 and 3. Any differences between alternatives are described in the text.

Wildlife

- Limited Operating Periods (LOPs) will be implemented to avoid direct adverse impacts to the northern spotted owl. From February 1 through July 10, all noise- and smoke-generating activities will be prohibited **within ¼ mile** of suitable nesting/roosting habitat (all project units potentially affected). In addition, all vegetation removal/cutting/burning **within** suitable nesting/roosting habitat will be prohibited from February 1 through September 15 (all units *except* 2, 3, 4, 5, 6, 8 and 18 would be affected). Currently annual surveys for northern spotted owl are being conducted in the project area to determine occupancy. The owl LOPs may be lifted if year-of-action surveys, using currently accepted protocols, indicate specific areas are not occupied by breeding owls, and with the mutual agreement of U.S. Fish and Wildlife Service and the Forest Service.
- Retain existing large (>19 inches diameter at breast height) snags and down logs within thinning units. Snags felled for safety reasons would be left on site as logs.
- Maintain an average fuel load (dead and live fuels 3 inches in diameter and smaller) at 5 tons per acre.
- Protect and retain viable hardwood trees during harvest and fuels hazard reduction treatment activities.
- All activity is prohibited within 250 feet from known Townsend's, big-eared, and/or Pallid bat roost sites (caves, mines, and mine adits). See wildlife resource protection map in project record for known roost sites.
- Loud and continuous noise disturbance is prohibited from February 1 through August 15 within ¼ mile of active goshawk nest sites. Year-of-action surveys will be conducted to determine goshawk occupancy in the project area, and LOPs will be imposed to protect breeding goshawks.

Botany

- Sensitive or endemic plant populations will be flagged, and identified as a “controlled area,” and excluded from treatment.

⁴² Gemmill Thin Project Planning Record. *Gemmill Thin Alternative 4 Findings*, May 2006.

- Serpentine and chert outcrops will be flagged and excluded from treatment to protect sensitive plant populations and habitat.
- Contract Provision C6.35 [Equipment Cleaning 7/01] or most recent version of this contract provision would be incorporated into the timber sale, or other contract, as a protection measure to prevent the spread of invasive weeds.⁴³ This provision requires that all equipment is free of noxious weed seed prior to entering the assessment area.

Streamcourse Protection Zones

- All streamcourse protection zones would be flagged and/or signed within proposed treatment units, and identified as "Protect Streamcourse" on project maps.
- There will be no mechanical entry or harvesting within 50 feet of the high-water mark, or within the inner gorge (no mechanized equipment on slopes over 35%), or as otherwise designated on the ground for streamcourse protection zones, except at approved designated crossings.
- Within designated stream course protection zones, skid trail crossings shall not exceed 20% grade, and shall be located so as to minimize ground and vegetative disturbance.
- There will be no primary fire ignition within streamcourse protection zones. Provide for minimal-intensity prescribed fire conditions to attain desired prescription burn treatment objectives. Hand cut, hand pile and burn piles where feasible in lieu of broadcast burning within streamcourse protection areas. As a general rule, burn piles should not be larger than four feet high and six feet in diameter, on average. Project prescribed burning shall be implemented consistent with the programmatic fisheries biological assessment for the Forest prescribed fire program.⁴⁴
- Area of disturbance will be confined to the stream crossing and associated road prism. New crossing structures will be designed to accommodate unobstructed passage of stormflows. Fill and sediment will be removed from streambed to expose native substrates. Duration of disturbance will be less than two weeks at each site.

Fuels

- Use of prescribed fire is to conform with Forest Service, California Air Resources Board, and North Coast Unified Air Quality Management District guidelines.
- Post-treatment total soil ground cover shall range from 51-70%, when available. Provide for a minimum of 50% of the ground cover as fine organic matter, of generally less than three-inch in size, if available. Ground cover is defined as any combination of duff mat, litter, fine organic materials (less than three-inch diameter), coarse organic materials (greater than three-inch

⁴³ A copy of the complete text of the contract provision can be obtained at the Weaverville Ranger District or on the web at http://www.fs.fed.us/invasivespecies/documents/FS_WeedBMP_2001.pdf.

⁴⁴ The programmatic fisheries BA for the Forest prescribed fire program, and associated letter of concurrence from NMFS, were prepared in 1998 and are available from Forest Headquarters upon request.

diameter), live vegetation in contact with the soil, and rock fragments (greater than ¾-inch diameter). Fuel reduction activities should retain 50% or greater, of the existing duff mat.

Timber Harvest Operations

- The aquatic period of operation (APOO) is from May 15 to October 15. No ground disturbing activities⁴⁵ will occur from October 16 through May 15. No new work will begin after October 14. Work may proceed after October 15 with fishery biologist and/or hydrologist approval. This will only occur if dry weather is forecasted. Typically this situation is approved when a project is not complete and more damage may occur by leaving it unfinished. Erosion control measures will be implemented on or before October 15, or in the event of substantial precipitation events during the summer. If there is approval to work beyond October 15, erosion control measures will be in place at the end of each workday.
- Ground disturbing activities will only occur when soils are dry down to 8 inches in depth, or soil conditions are such that the operations will not result in compaction or accelerated soil erosion. Ground disturbing activities will not occur during wet weather conditions within the APOO without the consent and approval by a Forest Service earth scientist prior to the initiation of activities.
- Where soils with severe compaction hazard have been identified,⁴⁶ ground-based mechanical equipment will only operate when the soils are dry down to 8 inches from June 1 through September 30, inclusive and without exception (see *Shasta-Trinity Wet Weather Soil Compaction Hazard Ratings* for restrictions). *Units affected: 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 31, 32, 33, 35, 36, 37, and 39.*
- Mechanical skidding equipment is generally restricted to slopes less than 35%. When slopes are >35% and <45% mechanical skidding equipment is restricted to slash covered primary skid trails.
- Minimize soil erosion by water-barring all skid trails, mulching with straw or fine slash (achieve 75%+ cover) the last 50 feet of all skid trails where they enter main roads.
- Skid trails, temporary roads and landings will be located and constructed without removing any trees 24 inches or greater DBH.
- Short-Term Need Landings Post-use Mitigation: Rip with winged sub-soiler to a depth of 18 inches, mulch at a rate of 1.5 tons/acre, and seed with native grass at a rate of 50 lbs/ac all short-term need landings and primary skid-trails (the last 200 feet to the landing).
- Long-Term Need Landings Post-use Mitigation: Scarify to a depth of 6 inches, and mulch (rice straw or wood chips) at a rate of 2 tons/acre.
- Landings should be constructed to adequately drain with crowned landings and directed drainage with catchments (rock armoring and/or silt fences with straw bales may be used as necessary).

⁴⁵ Ground disturbing activities include yarding, fire line construction, machine piling, road reconstruction, and road maintenance activities.

⁴⁶ Map 5 in Appendix A shows the location of project area soils with severe compaction hazard rating.

All new landing fill slopes and road fill slopes (>100 square feet) would be mulched initially, and the mulch would be maintained throughout the life of the project. Landings with slopes of less than 25% and greater than 0.5 acre should have natural, non-constructed designs with slash covered operating areas.

- Limit primary skid roads, trails, and landings to occupy no more than 15% of the treatment unit. The objective is to design a skidding pattern that best fits the terrain, and limits soil impact. Pre-designated skid trails, felling to the lead, and end lining are methods to be used to achieve this. Skid trails shall be outsloped, and not located in swales, where water barring is not possible or requires deep cuts. Re-use existing skid trails and landings whenever available and practical. (Best Management Practices 1-10, 1-12, 1-13, 1-16).

Transportation System

- If hauling is approved to occur outside the APOO (due to dry conditions), the placement of aggregate base course may be required to provide a stable running surface and prevent rutting and potential erosion. Snow berms will be removed or drains installed to avoid channelization of melt water to minimize potential for damage to the road and to protect water quality. If the road surface is damaged, lost surface material shall be replaced, and damaged structures repaired. (Best Management Practices 2-23, 2-24 and 2-25.)
- Purchaser-utilized roads rutted or otherwise damaged by Purchaser operations shall be spot-rocked or otherwise suitably repaired. Drainage structures shall be protected or repaired as necessary. The road surface shall be outsloped, if possible, during maintenance operations. Road surfaces in areas crossing serpentinitic soils should be rocked to prevent roadbed deformation (rutting) during wet conditions.
- Wing subsoil to an estimated 18 inches in depth, mulch, or use available organic material to achieve 2 tons/acre, all temporary roads used in timber-harvest activities post-use. Prevent road runoff from draining onto skid trails and landings.
- Roads used for haul will be watered for dust abatement, or dust abated through application of a Contracting Officer⁴⁷-approved material.

Water Drafting

- Water drafting will occur in project area creeks. When drafting from coho salmon critical habitat,⁴⁸ National Marine Fisheries Service (NMFS) water drafting specifications will be adhered to. NMFS developed water drafting specifications to minimize impacts to listed fishes. In order to protect coho salmon, the Operating Guidelines presented in the water drafting specifications will be adhered to as described below.

⁴⁷ Contracting Officer or person of delegated authority.

⁴⁸ Location of coho salmon critical habitat is shown in Appendix A, Map 5.

Operating Guidelines

- Operations are restricted to one hour after sunrise to one hour before sunset.⁴⁹
- Pumping rate shall not exceed 350 gallons per hour.
- The pumping rate shall not exceed ten percent of the stream flow.
- Seek streams and pools where water is deep and flowing, as opposed to streams with low flow and small isolated pools.
- Pumping shall be terminated when the tank is full. The effect of single pumping operations, or multiple pumping operations at the same location shall not result in obvious draw-down of either upstream or downstream pools.
- Each pumping operation shall use a fish screen. The screen face should be oriented parallel to flow for best screening performance. The screen shall be designed and used that it can be submerged with at least one-screen-height-clearance above and below the screen.
- Operators shall keep a log on the truck containing the following information: Operator's Name, Date, Time, Pump Rate, Filling Time, Screen Cleaned (Y or N), Screen Condition, Comments. These guidelines should be included as instructions in a logbook with serially numbered pages. This assures each truck operator easy access to this information.

When drafting water **outside** of critical habitat, standards and guidelines found in the Shasta Trinity National Forest Plan section 18 k. (1) – (3) (page 4-25) will apply:

When watering roads for dust abatement, follow the following rules:

1. Allow drafting from fishery streams only where immediate downstream discharge is maintained at 1.5 cubic feet per second (CFS) or greater.
2. Allow drafting from ephemeral streams, intermittent streams, wetlands or constructed ponds provided that sufficient water quantity and quality remains to support associated wildlife species and riparian values.
3. Never allow drafting to remove more than 50 percent of any stream discharge or 75 percent of constructed pond water.

General Protection Measures

- To avoid direct effects on recorded archaeological sites, sites will be flagged and avoided following the protective measures outlined in the Region 5 Section 106 Programmatic Agreement. These sites will be identified in the timber sale contract as controlled areas to be avoided.
- If additional threatened, endangered, or sensitive species, cultural resource sites, or any sensitive or watch list plant species are discovered within the assessment area, the appropriate protection

⁴⁹ The purpose of NMFS Operating Guideline 1) is to prevent fish from being attracted to the drafting pool by vehicle lights, therefore this guideline will only be implemented if coho salmon are likely to be present at the drafting location. Coho salmon have not been found in Hall City Creek or Wilson Creek (where drafting is proposed) and are not expected to occur there; therefore, guideline 1 is not necessary.

actions will be taken. Contract Provision C/CT6.25# or most recent version of this contract provision would be incorporated into the timber sale contract as a protection measure.

Comparison of Alternatives

Table 2-3 provides a brief summary of the environmental impacts of the alternatives in comparative format. In this table, alternatives are compared by issue, responsiveness to the purpose and need, and resource effects. Chapter 3 forms the scientific and analytical basis for this comparison of effects and describes effects in detail.

Table 2-3. Comparison of alternatives

Comparison item	No Action	Alternative 1	Alternative 3
Total acres treated	0	Approximately 1618 acres	Approximatley 1462 acres
Treatment type	N/A	Commercial thin: 1279 acres Fuelbreak: 268 acres Plantations: 44 acres Fuel buffers: 27 acres	Commercial thin: 1140 acres Fuelbreak: 268 acres Plantations: 44 acres Fuel buffers: 27 acres
Logging systems	N/A	Tractor: 1266 acres Cable: 142 acres Heli: 139 acres	Tractor: 1266 acres Cable: 125 acres Heli: 0 acres
Age/size of trees harvested	N/A	Only trees less than 150 years old will be removed; all snags greater than 19 inches will be retained. Predominant and dominant trees will not be removed. The largest and healthiest trees are retained while the smaller supressed, intermediate, and codominant trees are targeted for removal. Few trees harvested would be greater than 18 inches DBH, however trees over this size may be removed when they are in direct competition with a larger tree. For road and landing activities, no trees greater than 24 inches DBH will be removed.	Same as for Alternative 1 except that no trees greater than 18 inches DBH would be removed, even when they are in direct competition with a larger tree.
Behave Fire Prediction Program results (fuel models, flame length and fire size)	FM 10 Estimated flame length: 12.8 feet Fire size in 1 hour: 50 acres	FM 8 Estimated flame length: 2.4 feet Fire size in 1 hour: 2 acres	FM 9 Estimated flame length: 7.1 feet Fire size in 1 hour: 46 acres

Comparison item	No Action	Alternative 1	Alternative 3
Reduce hazardous fuels	Fire Condition Class is at 3, the fire regime has been significantly altered from the historical range. Existing hazardous fuel loadings adjacent to and within the Wildwood WUI would not be reduced. Fire Condition Class will be unchanged. As overstocked stands develop, mortality (natural and exacerbated by insect/disease) would increase ground and ladder fuels. Adverse cumulative effects would occur in the form of continued fuel build-up and increasing fire hazard and risk.	Both action alternatives improve Fire Condition Class. Creates the desired condition in the project area for fire resilient stands by removing surface and ladder fuels and thinning crowns. Wildfires have less chance of transitioning into crown fire. Wildlife starts within the project area would be easier to suppress and less costly. Trees that would have died and contributed to fuel loading over time are removed as commodity. This alternative is the most effective pre-treatment for potential future underburning for fuels reduction.	Both action alternatives improve Fire Condition Class. The ability to modify crown bulk densities would be restricted, and may increase likelihood of crown fire relative to Alternative 1. Surface fuels and small to medium ladder fuels would be removed however larger ladder fuels (over 18 inches DBH) would remain. This alternative would provide effective protection in more moderate fire weather, but in severe fire weather the larger (18 to 24 inches DBH) ladder fuels are likely to lead to crown fire. This alternative provides sufficient pre-treatment for future underburning but prescription parameters and burn "windows" would be shorter.
Fuelbreak maintenance	Live and dead vegetation would continue to increase, adversely impacting functionality of the fuelbreak for fire suppression.	Restores functionality of the fuelbreak for future fire suppression and/or safety area for fire fighters.	Provides for some maintenance of the fuelbreak, although the overall effectiveness would be reduced (as compared to Alternative 1). Due to the diameter limit, it may not be possible to thin down to 40% crown closure which reduces the likelihood that the fuelbreak could be used to effectively stop fires.
Accelerate development of late-successional habitat - forest health	Continuing competition for sunlight, nutrients, and soil would reduce overall stand vigor, increase susceptibility to insect and disease effects, and increase stand mortality. Dominant trees will continue to compete for resources with smaller shade-tolerant trees in the understory. Overcrowded conditions in mature stands continue to delay the establishment of functional old growth habitat. Due to increasing competition, hardwoods are not likely to remain a viable stand component.	Thinning would reduce competition, improve the ability of residual trees to withstand future drought conditions and insect infestations, and provide conditions for accelerated tree growth. Stand vertical structural diversity would be maintained or improved. Hardwoods would be retained and remain a viable stand component.	Because of the diameter limit it would not be feasible to clear larger existing ladder fuels (18 to 24 inches DBH) away from dominant trees. Like with Alternative 1, growth of residual stands is likely to be accelerated due to reduced competition; however with Alternative 3 dominant trees may not experience as much release (or growth response) due to retention of all trees over 18 inches DBH. Relative to Alternative 1, the oldest trees would also be at increased risk due to the retention of competing trees (greater than 18 inches DBH) that can act as fuel ladders for crown fire spread. Hardwoods would be retained and remain a viable stand component.

Comparison item	No Action	Alternative 1	Alternative 3
Plantations	Due to high stocking densities and accumulating fuels, the risk of stand-replacing wildfire would continue to increase. Overcrowded conditions would continue to delay the development of late-successional/old growth habitat. Without thinning, plantations would remain so dense that owls would not be able to freely fly through them for 35+ years.	Stocking densities would be reduced to levels that improve stand vigor, and reduce mortality as well as susceptibility to insect and disease. The action alternatives are likely to accelerate the growth and development of remaining trees while reducing fire risk. The action alternatives are likely to result in the development of northern spotted owl connectivity habitat in approximately 10 years within plantations proposed for treatment (about 43 acres).	Same as for Alternative 1
Effects to late-successional habitat - wildlife	Overcrowded conditions are not likely to result in long-term health and maintenance of key old growth habitat components because the largest and oldest trees are at increasing risk to mortality and existing understory trees will not provide similar replacement structures. Without thinning, overstocked stands will not meet the need for more old growth habitat within the LSR. Growth of the largest/oldest conifers and understory hardwoods would continue to be delayed due to competition for limited site resources. Untreated stands would remain vulnerable to fire events that is likely to reduce them below suitable owl habitat conditions within the short-term (10-15 year) timeframe, as estimated by fire and fuels modeling.	The reduction in fuels and the concurrent increase in the vigor of the remaining trees would allow the treated stands to better survive late-summer fire events and provide late-successional habitat into the future. There will be a short-term reduction in canopy closure, a reduction in vertical structure, and a reduction in small diameter snags and logs concurrent with reduction of existing and future fuels. Beneficial effects include a more open forest understory which would improve owl/goshawk foraging abilities, reductions in fuel loading and the risk of stand-replacing wildfire, and increasing availability of water, nutrients, and sunlight for the largest/oldest trees.	Effects are similar to those for Alternative 1 except that, due to the diameter limit, there would be less thinning/release around the largest, oldest trees. There would be less reduction in vertical structure and canopy closure because fewer trees would be harvested. There would also be less temporary reduction in habitat for species such as the fisher because more surface fuels and larger ladder fuels (trees over 18 inches DBH) would be retained. There would still be beneficial effects, as described for Alternative 1, although they would be somewhat reduced due to the diameter limit (i.e. less reductions in fuel loading and less of an open understory).

Comparison item	No Action	Alternative 1	Alternative 3
<p>Effects to late-successional associated wildlife species</p>	<p>No direct effects to any of the species associated with the old-growth or late-successional habitat because no actions would take place. With no action, the probability of losing key habitat features associated with late successional habitat such as closed canopy, large snags and downed logs due to a late summer fire event continues to increase.</p>	<p>Direct effects to northern spotted owls and goshawks would be avoided through the use of year of action surveys and the application of Limited Operating Periods (LOPs). For northern spotted owl, the project Biological Assessment and Biological Opinion document that although the project would result in short-term degradation of stand-level habitat, it is not likely to jeopardize the continued existence of the species and it is not likely to destroy or adversely modify designated critical habitat. Both action alternatives may impact individual fisher due to disturbance during project implementation. Disturbance would be short-lived and would not exacerbate the threats to viability identified by USFWS.</p>	<p>Same as for Alternative 1</p>
<p>Effects to northern spotted owl nesting/roosting/foraging (NRF) habitat in the action area (16,858 acres)</p>	<p>No net increase or degradation of habitat. Existing NRF habitat in the action area: High Quality NR = 1,688 acres Mod. Quality NR = 3,908 acres Foraging = 2,083 acres</p>	<p>For both action alternatives, temporary degradation of existing NRF habitat will be short-term (lasting 10-15 years), will reduce the overall threat of stand-replacing wildfire, and improve growing conditions for residual stands. In the short-term the minor net reduction in NRF habitat in the action area is 3 acres of High Quality NR, 9 acres Mod Quality NR, and 3 acres of Foraging (Alt 1 and 3). Thinning within younger stands (existing foraging habitat, connectivity habitat, or capable owl habitat) is likely to result in development of moderate quality NR or foraging habitat within 10-15 years (short-term). In the long-term the treated NRF will increase in quantity and relative quality: High Quality NR = 1,685 acres Mod. Quality NR = 4,278 acres Foraging = 2,029 acres</p>	<p><u>Short-term</u> NRF habitat would be the same as for Alternative 1. Benefits to NRF in the <u>long-term</u>: High Quality NR = 1,685 acres Mod. Quality NR = 4,261 acres Foraging = 2,046 acres</p>

Comparison item	No Action	Alternative 1	Alternative 3
Soils	Soils would not be affected by management activity, and the risk of stand-replacing fire will continue to increase. If a stand-replacing fire were to occur severe erosion would occur removing soil cover and causing organic matter destruction in the topsoil.	Erosion due to the project would be low to moderate, less than 1 ton per acre. The risk of stand-replacing wildfire in the area would be reduced. Both action alternatives retain approximately 50% soil cover across the units and would result in conditions within the established Soil Quality Standards.	Erosion due to the project would be low to moderate, less than 1 ton per acre. With Alternative 3 stand health would not be effectively treated and soil fertility could be affected with increased root disease. Relative to Alternative 1, more trees would remain post project so there would be increased soils cover in the form of fallen leaves and duff. Both action alternatives retain approximately 50% soil cover across the units and would result in conditions within the established Soil Quality Standards.
Open road density	Approximately 5.72 miles per square mile	Approximately 4.10 miles per square mile	Same as for Alternative 1
Estimated Volume	0	4.8 MMBF	4.3 MMBF
Present Net Value	0	\$49,236	\$113,047
Est. Jobs Created, direct and indirect	0	Direct: 19-34 person years Indirect: 34-43 person years	Direct: 17-30 person years Indirect: 30-39 person years

