United States
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Agriculture

Forest
Service

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Environmental Assessment

Murray Fire Salvage

Paulina Ranger District, Ochoco National Forest
Crook, Wheeler and Grant County, Oregon

T. 16 S., R. 26 E., Sections 9 and 10

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SUMMARY

The Ochoco National Forest proposes to salvage approximately 514 MBF of trees that are dying or were killed by a wildfire and to plant conifers within the burned area. The project area is located approximately 60 air miles east of Prineville, Oregon, Township 16 South, Range 26 East and is within the Paulina Ranger District, Ochoco National Forest, Oregon. This action is needed because several conifer stands were destroyed or severely damaged by a stand replacement wildfire during July of 2002.

The proposed action may remove approximately 514 MBF of timber and plant conifers within approximately 140 acres of the Murray Fire. Additional reforestation activities include seedling protection from big game and pocket gophers. These protection measures are usually done for a period of about four years after planting.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- *No Action – No salvage harvest or planting of conifers would occur in the project area.*
- *Alternative 3 – Proposes to harvest an additional 18 acres of dying and dead trees (approximately 157 acres) and to plant conifers in the burned area. The estimated volume to be recovered is 580 MBF.*

Based upon the effects of the alternatives, the responsible official will decide whether to salvage dead and dying trees to recover the economic value of the timber and whether to plant conifers.

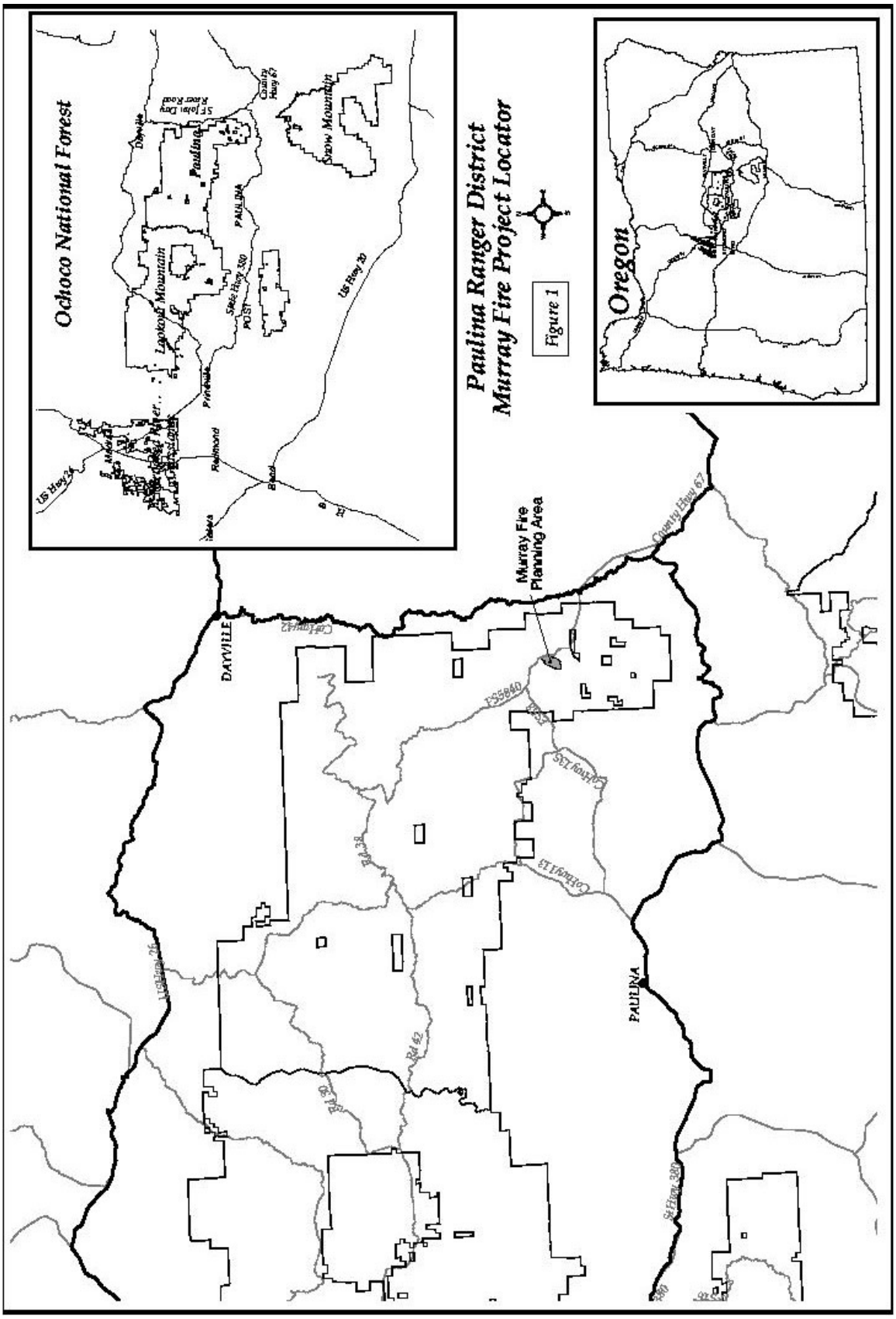


Figure 1. Vicinity Map

Chapter 1

Introduction

Document Structure

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

Chapter 1

- *Introduction:* The section includes information on the history of the project proposal, the Purpose of and Need for Action; a brief description of the agency's proposal for achieving that purpose and need, the Proposed Action; and provides details as to how the Forest Service informed the public of the Proposed Action and the public's response.

Chapter 2

- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's Proposed Action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on key issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of environmental consequences associated with each alternative.

Chapter 3

- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized first by alternatives, issues, and then resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.

Chapter 4

- *Agencies and Persons Consulted:* This section provides a list of preparers, agencies, and other persons consulted during the development of the environmental assessment.
- *Glossary*: A list and definitions of acronyms, abbreviations, and terms used.
- *Bibliography:* A list of references cited with the document.
- *Index:* The Index provides document topics with page numbers to facilitate locating information.
- *Appendix:* The appendix provides more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analysis of the project area resources, may be found in the project planning record located at the Paulina Ranger District Office in Paulina, Oregon.

Background

The Paulina Ranger District on the Ochoco National Forest has initiated an Environmental Assessment (EA) for the salvage of trees that were killed and dying due to the Murray Fire. Dry lightning ignited the Murray Fire during the afternoon of July 23, 2002. The fire grew quickly and severe fire behavior and rapid crown spread were already occurring by the time fire-fighting efforts had begun. Most of the trees in the 321-acre project area were killed. Major tree species in the burn area were ponderosa pine and western juniper, with primarily grass in the understory or a thick matt of pine needles under tree canopies. Shrub species were present but did not make up a large percentage of the understory.

The Murray Fire burned through an area that had stands of overstocked, small diameter ponderosa pine trees. Bark beetles had thinned clumps of these smaller trees leaving numerous small pockets of downed wood. These elevated levels of down wood together with the high density of small, understory trees acted to spread the fire from the ground into the canopies of larger trees. The fire was able to generate enough energy to rapidly move through the ponderosa pine stands and into the surrounding non-forested areas.

Purpose and Need for Action

The purpose of these actions is to capture the economic value of the fire-killed and dying trees through salvage and to reforest the area by planting conifers. These actions are needed because the area is currently characterized by ponderosa pine stands destroyed by a high intensity, stand replacement fire. Approximately 63% of the area burned at a high intensity where tree crowns were mostly consumed, causing extensive mortality and damage to most trees. Harvest of dead and dying timber would create jobs and support local economies if carried out shortly after the fire event. Trees killed by fire will lose economic value over time due to stain, drying, and decay. The fire occurred in July, followed by several months of hot, dry weather, starting the deterioration process. Stand reconnaissance conducted in late September of 2002 after the fire indicated that wood boring insects were already beginning to attack the dead timber.

This action also responds to the Ochoco National Forest Land and Resource Management Plan's (LRMP) Social and Economic goals and objectives to manage the Forest in a way that supports the social and economic viability of local communities while maintaining consistency with the principles of multiple-use and sustained yield (Land and Resource Management Plan, Ochoco National Forest, 1989). Recovery of timber before the end of the first summer would provide wood products with economic value, and would produce jobs from harvest and reforestation activities. This action also responds to Forest Service Manual 2435 (Salvage Sale Program) by:

1) Responds quickly to potentially serious catastrophes such as wildfire…to avoid unnecessary loss of value and volume.

2) Provides for the removal of damaged or dead timber, as soon as practicable following a catastrophic event.

3) Assists in the restoration of the forest resource when a catastrophe causes damage.

Stated goals in the Forest Plan are for "the production of wood products in a manner consistent with other resource objectives, environmental constraints and economic efficiency" (Section 4, page 4-31, Land and Resource Management Plan, Ochoco National Forest). Forest salvage volumes were estimated and planned as a part of annual wood product outputs from the Forest (Table 4-24, page 4-31, Forest Plan). Appendix A.10 of the Forest Plan further notes "salvage opportunities may occur on a very short notice and may alter the schedule of green tree timber sales where volume of green timber may be replaced with dead salvage." Proposing salvage of fire killed and damaged trees in the Murray Planning area is consistent with Forest Plan Objectives for utilization of the timber resources to recover an economic value.

Planting conifers is needed as the conifer seed source has been removed from most of the burned area. Natural regeneration of conifers is not expected to occur in numbers sufficient to adequately stock these sites within the next 30 years. Successful reforestation efforts require reestablishing seedlings as quickly as possible after a fire. This would increase the percentage of survival for the seedlings by reducing effects of grasses and ceanothus competing for the limited moisture on these sites. Planting trees would accelerate the reforestation period and accelerate reestablishing a forested condition. The existing condition of this area no longer meets Forest Plan objectives for General Forest or for Visual Management Areas to provide forest cover for production of timber products, recreation, and wildlife. Planting conifers would accelerate the recovery period and shorten the time required to meet Forest Plan objectives for General Forest and Visual Management Corridor Areas.

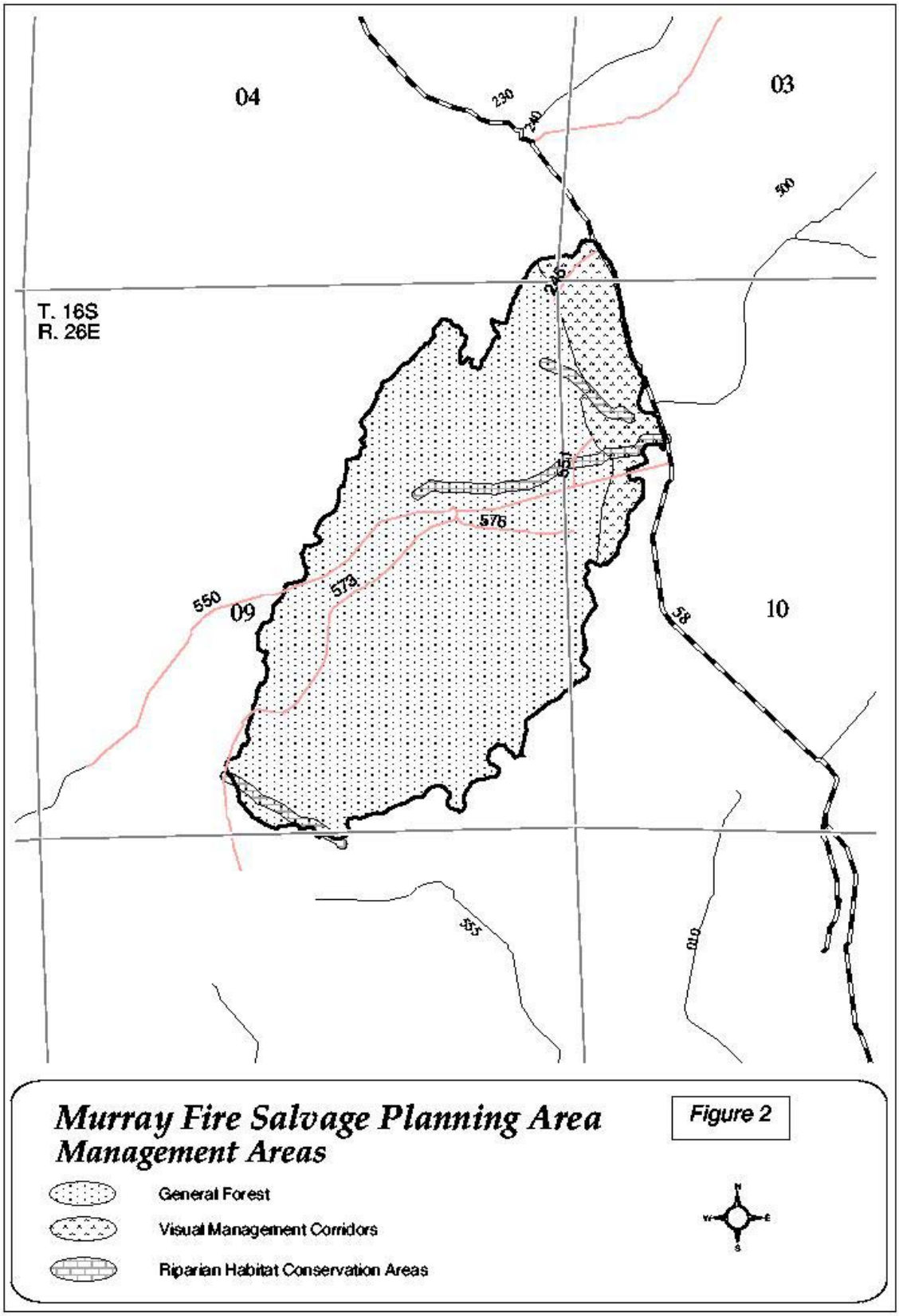
Descriptions of Management Areas and Management Direction

This project is tiered to the Final Environmental Impact Statement (FEIS) for the Ochoco National Forest Land and Resource Management Plan (Forest Plan), as amended, and its applicable Record of Decision (ROD). The management direction, along with standards and guidelines for activities proposed are based, in part, on these documents. In addition, the Interim Strategies of Managing Anadromous Fish-producing Watersheds in Eastern Oregon, Washington, Idaho, and Portions of California (known as PACFISH) provide additional direction management of riparian resources.

General Forest MA-F22. The majority of the project area, approximately 276 acres or about 86% of the planning area, is allocated to General Forest Land Management. The management emphasis is to produce timber and forage while meeting Forest-wide standards and guidelines for all resources (see Forest Plan, p. 4-86).

Visual Management Corridor MA-F26. Approximately 35 acres, approximately 11% of the planning area along Forest Road 58, are within the Visual Management Corridor MA allocation. The objective for this area is retention of visual quality, with an emphasis on maintaining a natural appearing character where management activities are usually not evident (see Forest Plan, p. 4-95).

Riparian Habitat Conservation Areas. Approximately 10 acres, or about 2% of the Murray Fire Salvage Project area, are within Riparian Habitat Conservation Areas (RHCA) associated with Class IV intermittent streams. The RHCA allocation overlaps both the Visual Management Corridor and the General Forest MA allocations.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Murray Fire Salvage Planning Area
Management Areas
Figure 2
General Forest
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Proposed Action

The actions proposed by the Forest Service to meet the purpose and need is to harvest approximately 139 of the 321 acres, that burned in the Murray Fire, for the purpose of providing for a timber product and to reforest the burned area. This is consistent with the Ochoco National Forest Land and Resource Management Plan. The trees would be harvested using a feller-buncher, a type of low-impact, ground-based equipment. Existing skid trails and landings would be used to minimize impacts to soils. No harvest would occur within Riparian Habitat Conservation Areas (RHCA). The proposed harvest activities would be designed to be consistent with all applicable Forest-wide and Management Area standards and guidelines. Snags would be provided for at an estimated average of 32 snags per acre. These levels are above the 100% biological potential level of 2.25 snags per acre in the Forest Plan. Planting of conifers would occur on approximately 140 acres after harvest activities are completed. Additional reforestation activities include seedling protection from big game and pocket gophers. These protection measures are normally conducted for a period of approximately four years after planting. See Chapter 2 for a more complete description of the Proposed Action.

Additional activities associated with the Proposed Action include: scarification of 2.5 acres to reduce detrimental soil conditions and to bring within Forest Plan standards; lopping and scattering residual logging slash material within units; placement of straw bales or silt fences as erosion control structures at or near the 5800-551 Road crossing into Unit 2; and hydrologically closing the 5800-551, 5800-575, 5800-573 and the 5800-245 Roads after completion of harvest activities through scarification, ripping, pulling berms, installation of waterbars, or felling trees.

Decision Framework

The Paulina District Ranger is the deciding official for this proposal. The decision will focus on which alternative to select based on the purpose and need and the analysis presented in this document. The deciding official will consider factors relating to the purpose and need, public comments, issues and environmental consequences in order to make the following decision:

- Whether or not to salvage dead and damaged trees and plant conifers within the burned area.

Specific questions the District Ranger will consider in making the decision include:

- How well does the alternative respond to the purpose and need and the issues?
- Does the alternative meet Forest Plan Standards and Guidelines for soil and water quality?
- Does the alternative meet Forest Plan Standards and Guidelines for snags and down wood habitat?
- What management requirements and design elements would be necessary to meet Forest Plan standards and guidelines for all resources?
- Does the alternative provide opportunities for communities to benefit through jobs and income?

The Deciding Official may decide to select one of the alternatives for salvage and planting, modify one of the proposed alternatives by adjusting the mitigation measures or treatments, drop some treatments or defer treatments of this area at this time.

Public Involvement

The proposal was listed in the Schedule of Proposed Actions on January 1, 2003. The proposal was provided to the public and other agencies for comment from November 19 through December 18, 2002. Additional public involvement was requested through a news release to Central Oregon newspapers on November 22, 2002 and through mailings to the District's Public Scoping list of individuals. County, State, Federal agencies and Tribes were notified announcing the Paulina Ranger District's proposal to analyze a fire salvage project. Several newspaper articles about the project appeared in the Blue Mountain Eagle and in the Central Oregonian in late November and early December. In addition, a public field trip was held on December 4, 2002 at the project area. Seven members of the public and eight Forest Service personnel participated in discussions in the field and later that day at the District office. Additional comments from the field trip were recorded as part of the scoping process and are on file at the Paulina District office.

Using the comments generated from the public scoping and field trip, other agencies, and the Confederated Warm Springs, the interdisciplinary team developed issues and an alternative to the proposed action. Documentation of all public comments raised during public scoping and how they were considered can be found in Appendix A of this document.

Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as a point of dispute, debate or disagreement with the proposed action based on an anticipated effect. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision being made; 4) able to be addressed through mitigation or project design, or 5) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

The Interdisciplinary Team (IDT) reviewed and considered all comments submitted by the public. Each comment was categorized by resource and then reviewed again to see if comments were similar and could be grouped. The Betscha Report was also submitted by reference by one of the commenters. This report was reviewed by the IDT for issues that the IDT felt were applicable to the site-specific conditions of this project area. Issues were then categorized by resource area and grouped with the other comments during issue development. The Betscha Report is a self-described "framework of principles and practices to guide development of federal policy concerning wildfire suppression, salvage logging and other post-fire recovery treatments" (Beschta, et al., 1995.). Because of this wide range of policy topics, some of the suggested guidelines pertaining to post fire recovery activities and wildfire suppression activities were considered outside the scope of this project as identified by the Purpose and Need and were not given further consideration.

Wildlife habitat was considered as a possible key issue by the ID Team to measure effects and for possible development of an alternative specifically around deadwood habitat. The project Wildlife Biologist discussed the current habitat conditions on the site with the team and explained that the greatest effects to the habitat had already occurred through the fire. The species of wildlife affected by salvage are not listed or sensitive but are Forest Plan Management Indicator Species (MIS) that are identified by the Plan to be used for purposes of monitoring implementation of Forest Plan guidelines. Providing habitat for MIS species is not mandated

direction. In addition, deadwood habitat is only a small component of wildlife habitat and this fire affected only a small portion of the subwatershed and watershed.

Based on the above rationale, the Wildlife Biologist concluded that the No Action Alternative best represented a "maximum" wildlife deadwood alternative. Any modification of retention rates to the Proposed Action was considered mitigation. For these reasons, deadwood habitat of snags and down logs are not going to be identified in this document as a key issue but will be fully analyzed with the effects disclosed within the wildlife section in Chapter 4.

The Forest Service evaluated all public comments received during scoping including recommendations from the Beschta Report. Based on the comments received, the Forest Service identified three key areas of issues. These issues include:

Soil Productivity: Aspects of soil productivity identified through scooping as key issues to track through this analysis includes: the existing detrimental soil conditions (soil compaction, displacement and burned soil) in relation to the Forest Plan Standards and Guidelines and Region 6 Soil Quality Standards (FSM 2520); nutrient loss from fire effects combined with salvage of wood material removed; and soil erosion and sediment transport due to removal of vegetative cover from the fire. Three measures have been selected to compare effects between the alternatives on these issues. The first measure is the number of acres of soil restoration necessary to reduce detrimental soil conditions to within Regional and Forest Plan standards. The second measure is model predictions of soil erosion and sediment yield using the Water Erosion Prediction Project model (WEPP). The third measure is a qualitative discussion of effects of each alternative on nutrients and soil biological processes.

Hydrology/Water Quality: The potential for changes to the hydrologic system and resultant water quality due to fire effects and proposed salvage activities were identified as issues to track for this analysis. The measures selected to compare effects includes a qualitative assessment of localized effects on sediment flow and effects to stream temperatures. An analysis of Equivalent Harvest Acres (EHA) is used as a measure to compare cumulative watershed-level effects between the alternatives.

Economics: Concern for quick removal of fire killed and dying trees was expressed as an issue as well as maximizing the amount of recovered volume. The fire-killed trees in the Murray Fire area are prone to rapid loss of wood quality from decay due to post fire insect activity and tree size. Measures selected to compare effects between alternatives on these economic issues will be timber volume loss through deterioration and jobs created through harvest and post sale activities.

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Chapter 2

Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the Murray Fire Salvage project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternatives (i.e. acres of harvest, volume recovered, snag retention levels, etc.) and some of the information is based upon the environmental, social, and economic effects of implementing each alternative (i.e., erosion, stream temperature and Equivalent Harvest Acres, etc.).

Alternatives

Alternatives Considered but Eliminated From Detailed Analysis

Restoration Only. Some public comments requested that a restoration-only alternative be considered. The Interdisciplinary Team considered these comments and discussed restoration activities, given that a Burned Area Emergency Rehabilitation (BAER) Plan had been developed immediately after the fire, and had identified and addressed site-specific restoration needs.

The Interdisciplinary (ID) Team concluded that the primary difference between a "Restoration Only" Alternative and the No Action Alternative would be the proposal of planting conifers in the burned area and soil restoration activities that bring existing conditions to within Forest Plan standards.

As restoration activities are already identified for implementation under a separate BAER Plan, the ID Team concluded that a "Restoration Only" Alternative and the required No Action Alternative would not show measurable differences in effects for hydrology, water quality, fisheries, wildlife, botany and noxious weeds resources. Cumulative effects under the required No Action Alternative will display effects of restoration activities that are already proposed under the BAER plan. The effects of soil restoration necessary to bring existing conditions to within Forest Plan standards are already displayed under Alternatives 2 and 3.

Planting responds, in part, to the purpose and need to reforest the area to provide for long-term forested conditions that would produce timber products, recreation experiences, and wildlife habitat. However, proposing a "Restoration Only" alternative does not meet the Purpose and Need for recovering an economic value of the damaged timber through salvage.

For the above reasons, this alternative was not considered in further detail.

Helicopter Harvest. This alternative was discussed by the ID Team to mitigate potential impacts to the soil resource. A preliminary cruise of the post fire conditions and pre-fire stand exams allowed the District to estimate the size and amount of potential salvage material and determine an estimated value (See Chapter 3, Environmental Consequences) for the material. Based on past experience in determining helicopter rates and the value of the material to salvage, this salvage project is not considered to be economically viable for helicopter logging.

The ID Team also considered the past levels of existing skid trails and established landings that could be reused without further detrimental impacts, and decided the economic feasibility of using a more expensive helicopter system over utilizing the existing skidding and landing systems was impractical. In addition, Forest Plan standards require that under the action alternatives,

including helicopter or logging over snow, soil restoration activities occur when thresholds of 20% are exceeded.

For the above reasons, this alternative was not considered further.

Over-Snow Harvest. This alternative was considered by the ID Team during alternative development and dismissed due to unpredictable winter snow conditions for this area. The past several winters have not received sufficient snow and prolonged periods of freezing temperatures to assure that the soil would be protected from logging activities. Requiring winter logging could prolong harvest for several years until there is little to no economic value to recover. The trees killed by fire will continue to lose economic value over the summer months due to insect activity, stain, drying, and decay. For the above reasons, the ID Team did not consider this alternative in further detail.

Alternatives Considered in Detail

Alternative 1 – No Action

Under the No Action Alternative no salvage harvest would occur within the project area and no planting of conifers would occur to reforest the burned area. Current management practices would continue to guide management of the project area (i.e. road maintenance, fire suppression, personal use firewood cutting, grazing, etc.). Current levels of detrimental soil conditions would continue to exceed the Regional and Forest Plan standards of 20%. Grazing would be limited to resting the burn area for the 2003 season as part of the Willow pasture's normal rest-rotation cycle. Grazing activities would resume in the 2004 season within the Willow pasture (which includes the burn area) under the current Allotment Plan. Activities under the Burned Area Emergency Rehabilitation Plan would continue to be implemented, as these activities are a separate action.

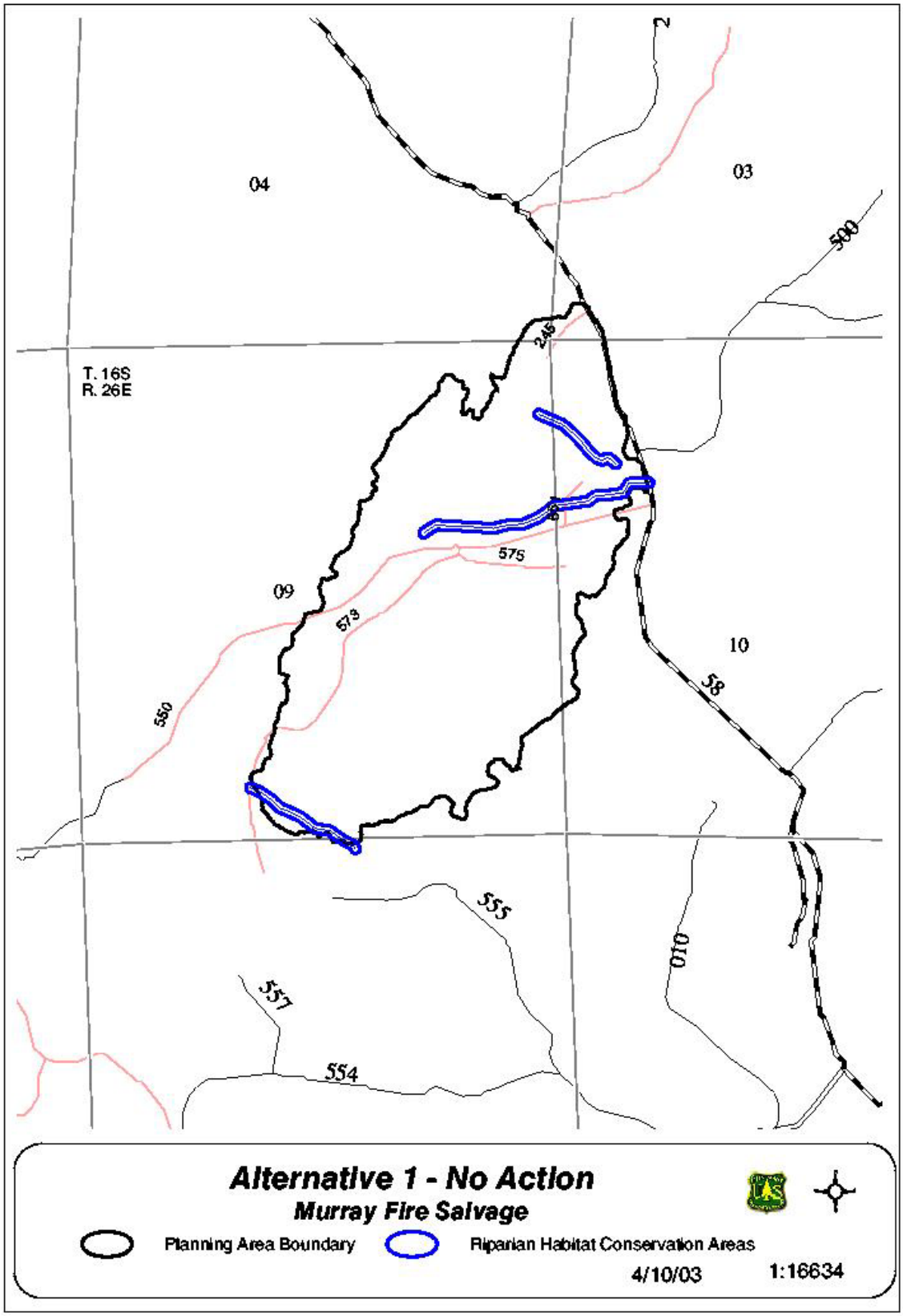


Figure 3. No Action

Alternative 2 – The Proposed Action

This alternative proposes to salvage harvest and plant approximately 139 acres. There are three units identified for harvest activities. See Table 1 below.

Table 1. Proposed Treatment Units for Alternative 2

Unit Number	Total Acres	Harvest Treatment	Harvest Method	Acres of General Forest	Acres of Visual Corridor
1	8	Salvage	Feller-Buncher	1	7
2	6	Salvage	Feller-Buncher	5.3	.3
3	125	Salvage	Feller-Buncher	123	2

Trees would be harvested using a feller-buncher. The number of passes on skid trails would be minimized. Existing skid trails and landings would be used to minimize additional impacts to soils. Trees would be whole tree yarded with tops attached. Tops and limbs would be left at the landing sites and burned after harvest activities.

In order to utilize the existing skid trails in Unit 1, trees would be skidded through an area not identified for salvage harvest under this alternative (Unit 4, Alternative 3). Past harvest activities in Unit 1 had included an area to the northwest and had designed the skidding and landing to service this larger area. Existing skid trails run parallel to the 5800 Road with an existing landing placed several hundred feet off of this road. From this location, the view of the landing is partially blocked by the topography of the area. Utilizing this existing system also meets visual quality retention standards for skid trails and landings.

No harvest would occur within Riparian Habitat Conservation Areas (RHCA). Units do not contain RHCA areas inside their boundaries.

Scarification of approximately 2.5 acres would be completed after harvest activities to meet Regional and Forest Plan soil standards.

After salvage harvest activities have been completed, a pre-plant survey would be conducted to determine the actual areas to plant with ponderosa pine seedlings. Planting would occur as soon as possible after harvest once seedlings are available from the nursery. If stocking or other surveys indicate animal damage is occurring above acceptable thresholds, protection measures such as gopher trapping or tubing would be performed to protect the seedlings.

Under this alternative, snags would be left in excess of the Forest Plan Standards levels to maintain habitat for the smallest home range for primary cavity excavators (10 acres). An estimated level of snags retained under this alternative is 31.7 snags per acre greater than or equal to 10 inches in diameter at breast height (dbh: 4.5 feet in height) of which 1.2 snags per acre would be greater than or equal to 20 inches in dbh. Approximately 20% of these snags left would be retained as individuals, or in groups of one to three trees, positioned toward the upper one half

of hill slopes. The remaining 80% of the retained snags would be in clumps from one quarter to one acre in size.

A drift fence would be installed to prevent livestock from trailing thru or to force the animals to utilize a different area. This temporary fence would consist of two-strands of electric wire and fiberglass stakes. The fences would be constructed around the 321 acre fire perimeter in 2004 and would be removed at the end of the grazing season.

Design Elements Associated With Alternative 2

The following design elements or mitigation measures are identified for implementation in this alternative to reduce the potential for negative impacts and respond to public comments:

Soil

1. For all units, skid trails would be designated and approved prior to logging operations. Existing skid trails would be utilized whenever possible to minimize additional compaction and displacement. There would be no skidding off designated skid trails. New skid trails would be laid out diagonally to the slope. These standards correspond to recommendations in the Beschta, et al, 1995 report for limiting activities on post-fire landscapes in areas suitable for salvage logging; and providing an opportunity for improving resources.

2. Harvest unit 1 currently exhibits less than 20% detrimental soil conditions (compaction/displacement). Existing skid trails and landings would be utilized so that detrimental soil conditions would remain under the 20% threshold after harvest and rehabilitation. Rehabilitation includes scarification of skid trails and landings.

In units 2 and 3 where existing soil conditions are above the Forest Plan standards, no net increase in detrimental soil conditions would be allowed. After harvest, scarification would occur to reduce detrimental soil conditions to within Forest Plan standards. If scarification is not feasible, operations that cause additional detrimental soil disturbance would be limited to already affected areas. These standards correspond to recommendations in the Beschta, et al, 1995 report for limiting activities on post-fire landscapes in areas suitable for salvage logging; and providing an opportunity for improving resources.

3. In all units, a 50-66 foot infiltration buffer would be used to reduce skid trail crossings and landings along forest/scabland interfaces.

4. In all units, the leading end of logs must be suspended above the ground during skidding or swing operations to limit soil displacement.

5. In all units, the logging residue remaining from bucking and limbing the trees would be lopped and scattered, bringing more small-diameter woody material in contact with the soil. This practice would help speed decomposition, disperse overland flow, trap sediment, and reduce the formation of gullies.

6. In units 1 and 2, existing log sediment traps would be protected from harvest operations or replaced after operations.

7. For all units, harvesting machinery would be excluded from scabland types (P4, P5, P54) due to the sensitive nature of these areas.

8. In all units, skid trails and landing would be seeded after scarification.

9. The 5800-551, 5800-575, 5800-573, and 5800-245 Roads would be hydrologically closed upon completion of harvest. Closure may include waterbars, felling trees into the prism, pulling berms and scarification. The district Hydrologist, Fisheries Biologist, and Soils Scientist would design all closure specifications.

10. Logging in all units would occur during periods when soil moisture conditions minimize the risk of compaction. Logging would not be allowed when water is running in the nearby Class 4 channels.

11. Slash Treatment after harvest for unit 2 would have slash scattered and placed along the south/southwest perimeters to provide surface roughness to retard overland flow. The slash on this site would not be burned. Scarification of landings would be considered on a site-by-site basis and coordinated with the district Hydrologist, Fisheries Biologist, and Soils scientist.

12. No skidding would occur up/down Class V swales.

13. Designated skid trails would not be placed on portions of units where the slopes exceed 35%. Skidding operations would be restricted and feller buncher and/or line pulling would be required. Those trails that would not be tilled and that exceed 10% slope would have water control structures (waterbars) installed upon completion of harvest.

Noxious Weeds

14. Avoid weed-infested areas for landings, staging and parking areas.

Alternative 2 and 3: the 5800 Road, junction of 5800/5800-550 Road including the pullout to the south near the cattle guard.

15. Survey all roads and skid trails proposed for closure prior to closure activity.

Alternative 2 and 3: the 5800-245, 5800-551, 5800-573, 5800-575 Roads and trails off of them.

16. As a mitigation measure to preclude the potential for transport or spread of noxious weeds by logging equipment, the contract must include the following provisions: (1) certification that equipment be clean or all plant or soil material that may result in the establishment or spread of noxious weeds; and (2) notification of location where equipment was most recently used.

17. Road maintenance, decommissioning, or scarification whether done by a public works contract, timber sale contract or government agency, would use the above equipment-cleaning clause.

18. If straw bales are needed for capturing sediment during roadwork or other activities, they should come from a source certified as weed free.

Alternative 2 and 3: along the 5800-550 Road where designated by the Hydrologist.

19. If the purchaser were required to seed any areas, the purchaser would be required to provide a copy of the Seed Analysis Report that identifies the noxious weed seed content.

20. Mineral sites that have been surveyed for weeds would be used as a rock source to support roadwork. When weeds are present, no disturbance would take place around the weed site.

Alternative 2 and 3: Sunflower Pit

21. Seed closed roads and landings to prevent noxious weed establishment. The seed mix would be determined by the district Botanist and Soil Scientist and would be certified as noxious weed-free.

Alternative 2: the 5800-551, 5800-573, 5800-575 Roads and landings.

22. Inspect and document all ground-disturbing operations for noxious weed infestations for three growing seasons following completion of the project.

Alternative 2: Units 1, 2, and 3. Roads 5800, 5800-245, 5800-550, 5800-551, 5800-573 and 5800-575.

Sensitive Plants

23. Buffers of 50 feet that exclude ground-disturbing equipment would be established around sensitive plant populations and habitat. Habitat for this project includes meadows, riparian areas and scablands. Exceptions may include the re-use of existing roads and areas reviewed by the district Botanist in coordination with other specialists.

Alternative 2: Units 1, 2, and 3

24. Use of the road off the 5800-575 Road that accesses the northeast side of unit 3 would be prohibited adjacent to the meadow.

Alternative 2 and 3: Unit 3

Hydrology/Fisheries

25. Existing log erosion barriers in Units 1 and 2 would be protected from harvest and kept from disturbance to the extent possible. Some barriers would need to be cleared and moved out of existing skid trails (if a barrier is longer than the trail is wide, then only that portion which is in the trail may be cleared). The Hydrologist would designate which bucked barriers may be harvested. Waterbars directed toward an existing barrier would replace harvested barrier(s) as flagged by the District Hydrologist. All designated log erosion barriers, remaining on site, would be marked with orange tree marking paint. If there is still erosion concern upon completion of the harvest, trees less than 7 inches in diameter breast height may be used for roughness material on trails.

26. No mechanized equipment would be allowed within the RHCAs unless where specified by the District Hydrologist or Fisheries Biologist.

27. Erosion control structures (straw bales/silt fences) would be placed at or near the 5800-551 Road crossing in Unit 2 to reduce the potential of sediment reaching streams. Erosion control structures would be placed at the 5800-551 Road crossing and on the northern 200 feet of the 5800-575 Road. Ditch line sediment traps would also be used along the south side of the 5800-550 Road. Structure placement will depend upon site-specific conditions as identified by Hydrologist or Fisheries Biologist.

Visuals

28. For fire salvage harvest, leave some or all of the standing trees with green and moderately burned crown in place. Leave approximately 20 to 30 burned trees per acre, of various sizes, standing for residual visual components. Trees in proximity to the road way and that may pose hazardous to a traveler must be removed (Highway Safety Act requirement).

29. A Landscape Architect would work closely with the IDT on treatment prescriptions and marking guides, specifically in areas where proposed treatment units fall within scenic view allocations.

30. Flush cut stumps (6 inches or less) within 75 feet (minimum) of roads or trail corridors that fall within the Foreground Scenic View landscape areas. Whole-tree-yarding method is required.

31. Slash treatment would be completed within one year as required for Visual Retention areas.

32. Following treatments, paint backsides of all leave trees, as necessary, to mitigate effects of residual paint on the scenic resource. When possible, use cut tree marking to minimize painted trees left behind. Remove ribbons and other markers following post treatment and completion of the project.

33. Where possible, design and locate skid trails and landing areas at least 300 feet away from a primary travel corridor such as a road so that it would not be highly visible.

34. Minimize ground disturbance within the foreground (Scenic View Landscape) areas to reduce soil contrast that may adversely affect scenic quality.

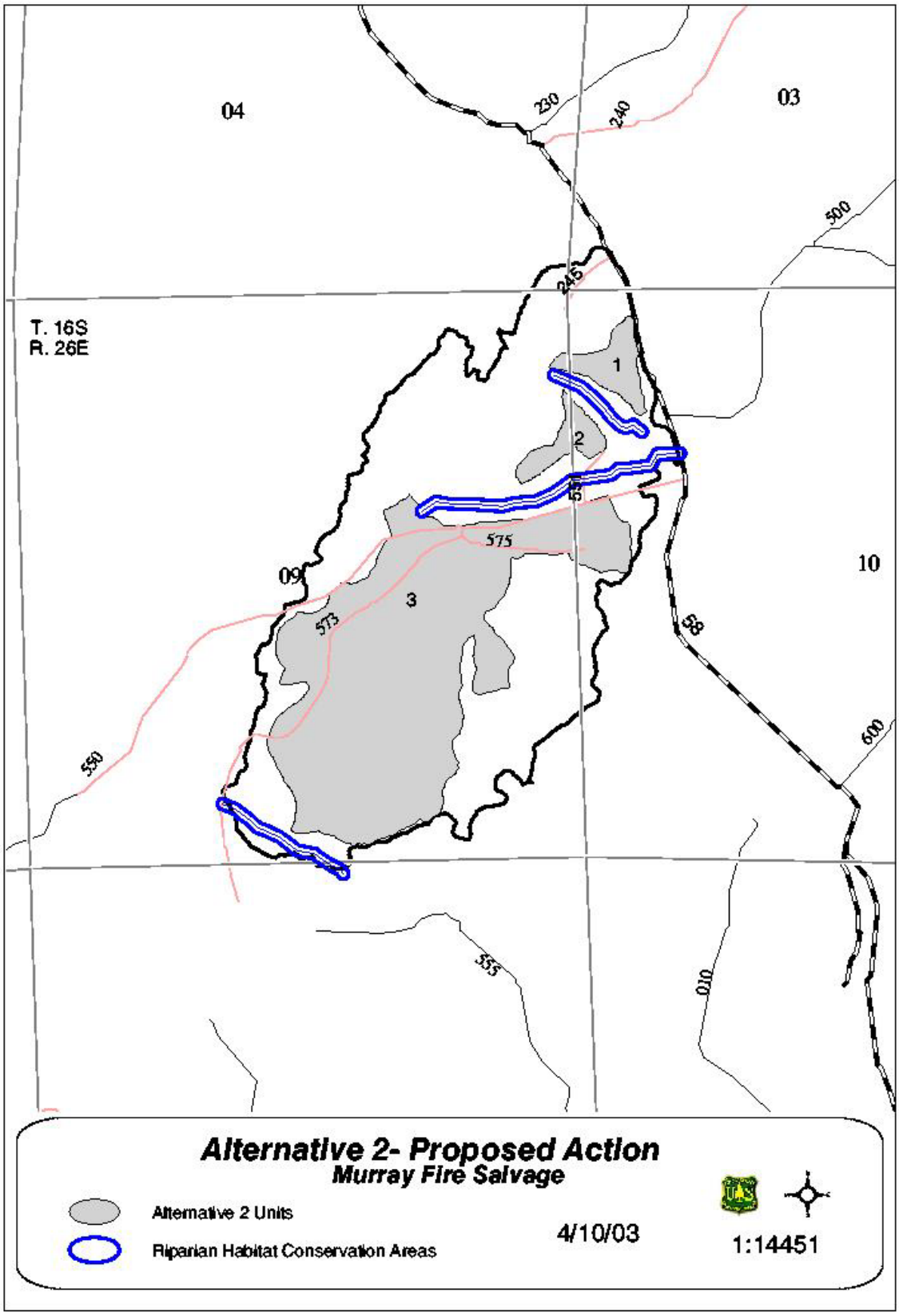


Figure 4. Alternative 2 – Proposed Action.

Alternative 3

This alternative proposes to salvage harvest and plant approximately 157 acres. There are four units identified for salvage harvest activities under this alternative. Three of these units are generally the same as identified under Alternative 2 with small additional areas added. A fourth unit in the north part of the planning area was also added. This unit sustained a lower intensity burn through a portion of the stand. Some trees were killed outright from the fire while others are expected to die shortly based on the amount of bole and crown scorch combined with mistletoe infections. These areas were added in part to respond to comments gathered during the public field trip concerning economics issues (see Table 2 and Figure 5).

Table 2. Proposed Treatment Units for Alternative 3

Unit Number	Total Acres	Harvest Treatment	Harvest Method	Acres of General Forest	Acres of Visual Corridor
1	8	Salvage	Feller-Buncher	1	6.8
2	10	Salvage	Feller-Buncher	9.5	.3
3	127	Salvage	Feller-Buncher	125	2
4	12	Salvage	Feller-Buncher	3	9

Again, trees would be harvested using a feller-buncher so that the number of passes on skid trails would be minimized. Existing skid trails and landings would be used where possible to minimize additional impacts to soils. Unit 1 would utilize the existing skid trails and landing area inside Unit 4. Tops and limbs would be left at the landing sites and burned after harvest activities.

No harvest would occur within Riparian Habitat Conservation Areas (RHCA). No RHCA areas lie within units.

Scarification of approximately 2.7 acres would be completed after harvest activities to meet Regional and Forest Plan soil standards.

After harvest activities have been completed, a pre-plant survey would be conducted to determine the actual areas to plant with ponderosa pine. Planting would occur as soon after harvest as possible once trees are available from the nursery. If stocking or other surveys indicate animal damage is occurring above acceptable thresholds, protection measures such as gopher trapping or tubing would be performed to protect the seedlings.

Under this alternative, snags would be left in excess of the Forest Plan Standards. The estimated snag levels retained would be 24.2 snags per acre for trees greater than or equal to 10 inches in diameter at breast height (dbh) of which 1.2 trees per acre would be greater than or equal to 20 inches in dbh.

A drift fence would be installed to prevent livestock from trailing thru or to force the animals to utilize a different area. This temporary fence would consist of two-strands of electric wire and fiberglass stakes. The fences would be constructed around the 321 acre fire perimeter in 2004 and would be removed at the end of the grazing season.

Design Elements Associated with Alternative 3

The following design elements or mitigation measures are identified to be implemented in this alternative to reduce potential impacts and respond to comments made during the public scoping process:

Soil

1. For all units, skid trails would be designated and approved prior to logging operations. Existing skid trails would be utilized whenever possible to minimize additional compaction and displacement. There would be no skidding off designated skid trails. New skid trails would be laid out diagonally to the slope. This responds to the Beschta, et al, 1995 report for limiting activities on post-fire landscapes in areas suitable for salvage logging, and to provide the opportunity for improving resources where identified and included in the design criteria.

2. Harvest unit 1 currently exhibits less than 20% detrimental soil conditions (compaction/displacement). Existing skid trails and landings would be utilized so that detrimental soil conditions would remain under the 20% threshold after harvest and rehabilitation. Rehabilitation includes scarification of skid trails and landings.

In units 2 and 3 where existing soil conditions are above the Forest Plan standards, no net increase in detrimental soil conditions will be allowed. After harvest, scarification would occur to reduce detrimental soil conditions to within Forest Plan standards. If scarification is not feasible, operations that cause additional detrimental soil disturbance would be limited to already affected areas. This responds to the Beschta, et al, 1995 report for limiting activities on post-fire landscapes in areas suitable for salvage logging, and to provide the opportunity for improving resources where identified and included in the design criteria.

3. In all units, a 50-66 foot infiltration buffer would be used to reduce skid trail crossings and landings along forest/scabland interfaces.

4. In all units, the leading end of logs must be suspended above the ground during skidding or swing operations to limit soil displacement.

5. In all units, the logging residue remaining from bucking and limbing the trees would be lopped and scattered, bringing more small-diameter woody material in contact with the soil. This practice would speed decomposition, disperse overland flow, trap sediment, and reduce the formation of gullies.

6. In units 1 and 2, existing log sediment traps would be protected from harvest operations or replaced after operations.

7. For all units, harvesting machinery would be excluded from scabland types (P4, P5, P54) due to the sensitive nature of these areas.

8. In all units, skid trails and landing would be seeded after scarification.

9. The 5800-551, 5800-575, 5800-573, and 5800-245 Roads would be hydrologically closed upon completion of harvest. Closure may include waterbars, felling trees into the prism, pulling berms and scarification. The district Hydrologist, Fisheries Biologist, and Soils Scientist would design all closure specifications.

10. Logging in all units would occur during periods when soil moisture conditions minimize the risk of compaction. Logging would not be allowed when water is running in the nearby Class 4 channels.

11. Slash Treatment after harvest for unit 2 would have slash scattered and placed along the south/southwest perimeters to provide surface roughness to retard overland flow. The slash on this site would not be burned. Scarification of landings would be considered on a site-by-site basis and coordinated with the district Hydrologist, Fisheries Biologist, and Soils scientist.

12. No skidding would occur up/down Class V swales.

13. Designated skid trails would not be placed on portions of units where the slopes exceed 35%. Skidding operations would be restricted and feller buncher and/or line pulling would be required. Those trails that would not be tilled and that exceed 10% slope would have water control structures (waterbars) installed upon completion of harvest.

Noxious Weeds

14. Avoid weed-infested areas for landings, staging and parking areas.

Alternatives 2 and 3: the 5800 Road, junction of 5800/5800-550 Road including the pullout to the south near the cattle guard.

15. Survey all roads and skid trails proposed for closure/decommissioning prior to closure activity.

Alternatives 2 and 3: the 5800-245, 5800-551, 5800-573, 5800-575 Roads and trails off of them.

16. As a mitigation measure to preclude the potential for transport or spread of noxious weeds by logging equipment, the contract must include the following provisions: (1) certification that equipment be clean or all plant or soil material that may result in the establishment or spread of noxious weeds; and (2) notification of location where equipment was most recently used.

17. Road maintenance, decommissioning, or scarification whether done by a public works contract, timber sale contract or government agency, would use the above equipment-cleaning clause.

18. If straw bales are needed for capturing sediment during roadwork or other activities, they would come from a source certified as weed free.

Alternatives 2 and 3: along the 5800-550 Road where designated by the Hydrologist.

19. If the purchaser is required to seed any areas, the purchaser would be required to provide a copy of the Seed Analysis Report identifying the noxious weed seed content.

20. Mineral sites that have been surveyed for weeds would be used as a rock source to support roadwork. When weeds are present, no disturbance would take place around the weed site.

Alternatives 2 and 3: Sunflower Pit

21. Seed decommissioned roads and landings to prevent noxious weed establishment. The seed mix would be determined by the District Botanist and Soil Scientist and would be certified as noxious weed-free.

Alternative 3: the 5800-245, 5800-551, 5800-573, 5800-575 Roads and landings.

Sensitive Plants

22. Buffers of 50 feet that exclude ground-disturbing equipment would be established around sensitive plant populations and habitat. Habitat for this project includes meadows, riparian areas and scablands. Exceptions may include the re-use of existing roads and areas reviewed by the District Botanist in coordination with other specialists.

Alternative 3: Units 1, 2, 3, and 4

23. Use of the road off the 5800-575 Road that accesses the northeast side of unit 3 would be prohibited adjacent to the meadow.

Alternatives 2 and 3: Unit 3

Hydrology/Fisheries

24. Existing log erosion barriers in Units 1 and 2 would be protected from harvest and kept from disturbance to the extent possible. Some barriers would need to be cleared and moved out of existing skid trails (if a barrier is longer than the trail is wide, then only that portion which is in the trail may be cleared). The district Hydrologist would designate which cleared barriers may be harvested. Waterbars directed toward an existing barrier would replace harvested barrier(s) as flagged by the district Hydrologist. All designated log erosion barriers, remaining on site, would be marked with orange tree marking paint. If there is still erosion concern upon completion of the harvest, trees less than 7 inches in diameter breast height may be used for roughness material on trails.

25. No mechanized equipment would be allowed within the RHCA unless where specified by the District Hydrologist or Fisheries Biologist.

26. Erosion control structures (straw bales/silt fences) would be placed at or near the 5800-551 Road crossing in Unit 2 to reduce the potential of sediment reaching streams. Erosion control structures would be placed at the 5800-551 Road crossing and on the northern 200 feet of the 5800-575 Road. Ditch line sediment traps would also be used along the south side of the 5800-550 Road. Structure placement will depend upon site-specific conditions as identified by the district Hydrologist or Fisheries Biologist.

Visuals

27. For fire salvage harvest, leave in place some or all of the standing trees with green and moderately burned crowns. Leave approximately 20 to 30 burned trees per acre, of various sizes, standing for residual visual components. Trees in proximity to the road way and that may be hazardous to travelers must be removed (Highway Safety Act requirement).

28. A Landscape Architect would work closely with the IDT on treatment prescriptions and marking guides, specifically in areas where proposed treatment units fall within scenic view allocations.

29. Flush cut stumps (6 inches or less) within 75 feet (minimum) of road or trail corridors that fall within the Foreground Scenic View landscape areas. Whole-tree-yarding method is required.

30. Slash treatment would be completed within one year as required for Retention areas.

31. Following treatments, paint backsides of all leave trees, as necessary, to mitigate effects of residual paint on the scenic resource. When possible, use cut tree marking to minimize painted trees left behind. Remove ribbons and other markers following post treatment and completion of the project.

32. Where possible, design and locate skid trails and landing areas at least 300 feet away from a primary travel corridor, such as a road, so it would not be highly visible.

33. Minimize ground disturbance within the foreground (Scenic View Landscape) areas to reduce soil contrast that may adversely affect scenic quality. Acceptable and recommended measures include, but are not limited to, cable and helicopter logging systems, and/or logging during times when the ground is frozen or packed with snow sufficient to protect soils from disturbance.

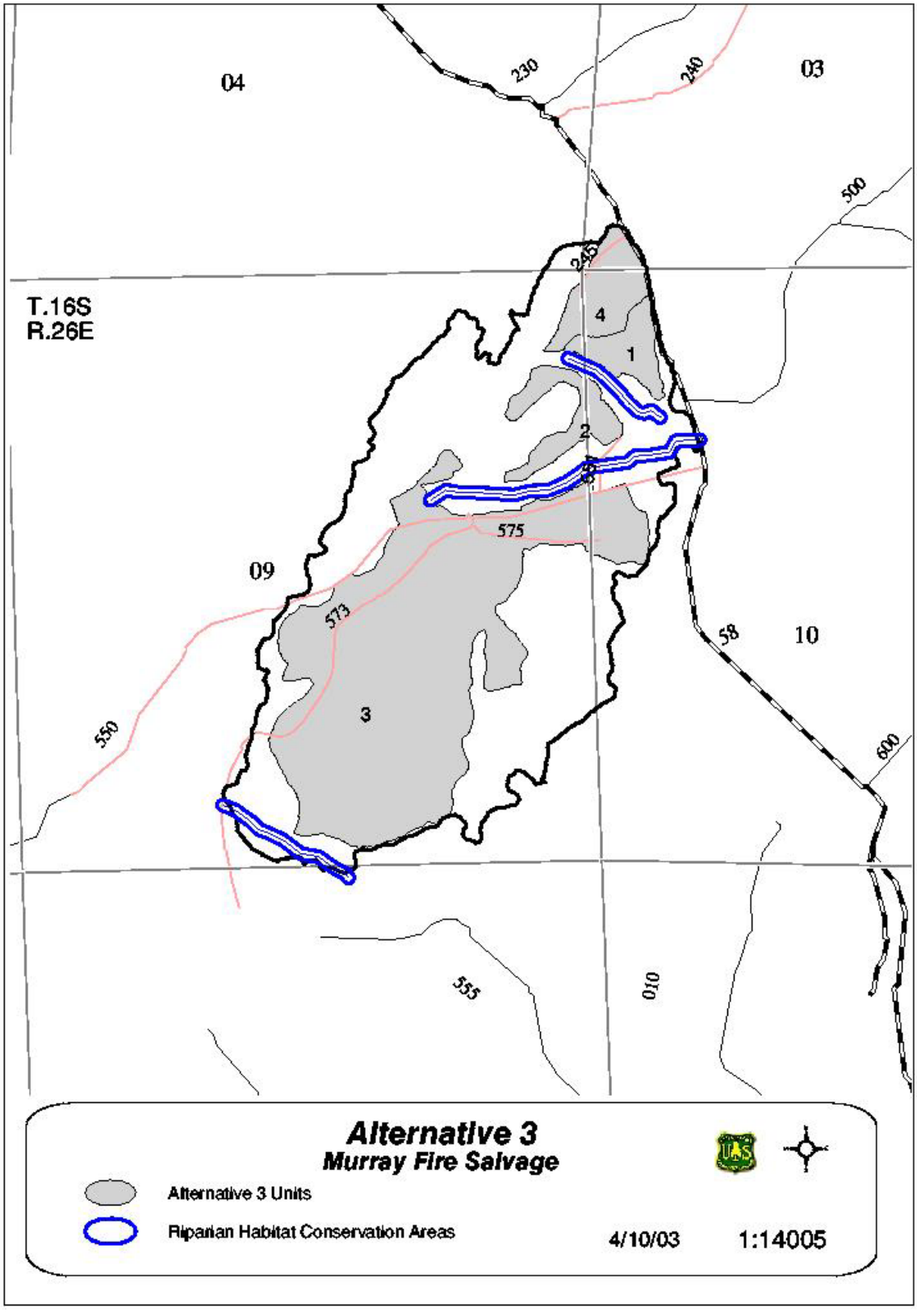


Figure 5. Alternative 3.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. The table below focuses on activities where effects can be compared among the alternatives.

Table 3. Comparison of Alternatives

	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
Acres of Salvage Harvest	0	139	157
Estimated Volume (MBF)	0	514	580
Acres Planted	0	139	157
Acres of Soil Rehabilitation*	0	2.5	2.7
Tot. Estimated Soil Erosion* (tons)	64.93	86.07	89.77
Tot. Estimated Sediment Tansport* (tons)	24.16	10.57	11.02
Soil Nutrients*	All snags left to accumulate over time as down wood	All trees 1-9 inch in diameter; lop and scatter tops	All trees 1-9 inch in diameter; lop and scatter tops
Stream Temperature*	No Measurable Effect	No Measurable Effect	No Measurable Effect
EHA Measure (Threshold 25%)	17%	< 1% increase	< 1% increase
Estimate of Timber Volume Loss through Deterioration*	802 MBF	288 MBF	222 MBF
Estimate of Jobs Created (Direct and Indirect)*	0	17	19
Estimated Snag Levels left	17,347 >= 10"; or 83/acre	6,557 >= 10"; or 31.7/acre	5,063 >=10"; or 24.2/acre

***** Indicates key measures identified to help compare effects between alternatives.

Chapter 3

Environmental Consequences

The following section summarizes the physical, biological, social, and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above. The following discussions of existing conditions and effects analysis are taken from each of the specialist's reports. The full text of each report is available upon request at the Paulina Ranger District Office.

Soils

Existing Condition

In July of 2002, an approximate 342-acre wildfire burned on the Paulina Ranger District of the Ochoco National Forest. The Murray Fire occurred largely on flat terrain with the majority of the fire having slopes below 10 percent. This is an area where two differing lithologies come together: basaltic (Hardscrabble Ridge) and rhyolitic. This makes for a difference in the surface rock size and configuration with the basalt having rounded cobbles and boulders and the rhyolitic area having flagstones and flat stones (Soils Report, 747/Murray Fire BAER, 2002). Depth to bedrock is generally 18 to 40 inches. Mean annual precipitation in the proposed planning area is estimated to be between 17 and 19 inches. Elevations range between 4760 and 4840 feet. Precipitation generally occurs as snow during the months November through May.

Soils in the area were mapped in the Ochoco N.F. Soil Resource Inventory (SRI) (Paulson, 1977). The Murray Fire Salvage Planning area occurs within a P3 landtype, which are Ash soils with the following characteristics: P3 mapping units consists dominantly of land type P3 and minor amounts of land types P2, P8, and P4. Landtype P3 is similar to landtype P8 with the exceptions of slope gradient and topographic positions.

Landtype P3 has shallow to moderately deep soils derived from ash, loess, and residuum. Surface soils are thin to moderately thick, sandy loams, loams, and silt loams. Subsoils are either lacking or very thin to thin, non-gravelly to very gravelly, and clay loams to silty clay loams. Occasionally, a very thin gravelly clay layer lies immediately above bedrock. This soil is well drained with moderate to rapid permeability in the surface soils and slow in the subsoils.

Bedrock is competent, hard, highly fractured basalts of the Picture Gorge formation of the Columbia River group. Depth to bedrock varies from 18 to 40 inches. Landtype P3 typically occurs on all aspects of gently sloping plateau flats, often appearing as timbered stringers within the scabland pattern of vegetation. Slope gradients are generally less than 15 percent.

This land type ranges in elevation from 4300 to 5500 feet and supports the vegetation community types of ponderosa pine – fescue and ponderosa pine – Douglas fir – elk sedge (Paulson, 1977).

Table 4. P3 Landtype – General Interpretations

Surface Soil Erosion Hazard (Slope & Rating)	0-15% Low
Subsoil Erosion Hazard	Low
Compaction Hazard	High
Mixing and Displacement Hazard	Moderate to High
Frost Heave Hazard	Moderate to High
High Surface Soil Temperature Hazard	High
Estimated Available Water Capacity	Surface- Moderate to High Subsurface- Low to High
Dustiness Hazard	High
Muddiness Hazard	Low

Table 5. P3 Landtype – Timber Interpretations

Susceptibility to Rhizomatous Grass Competition	Low to High
Potentials for Regeneration Natural & Artificial by Species	Natural – PP (low), DF (very low to low) Artificial – PP (High), DF (very low to low)
Limitations for Regeneration	Shorter Planting Season on South Aspects, Shallow, Droughty Soils Locally.
Considerations for Tree Harvest	Gentle Slopes, High Runoff, and Gully Potential on Intermittent Stream Terraces.

Table 6. P3 Landtype – Hydrology Interpretations

Water Yield Class	2
Bedrock Hydrologic Character	2 to 3
Hydrologic Group	B to C
Sedimentation Yield Potential	Surface – Low, Silt & Sand Subsurface – Low, Silt & Clay

Water Yield Class (2**)** – These soils have a moderate water detention storage capacity and a moderate rate of runoff. Water contributes to both peak flows and base flows.

Bedrock Hydrologic Character (2 to 3) – Class 2 indicates that the bedrock has a moderate capacity to store water. The rate of water transmission is moderate. Rocks in this class are generally hard, moderately fines textured, and moderately to highly fractured siltstone, mudstone, pyroclastics, argillite, and schist. Class 3 indicates that the bedrock has a relatively low capacity to store water. The rate of water transmission is rapid. Rocks generally in this class are fractured, coarse crystalline (i.e., granite, gabbro, and gneiss), and other hard-fractured rocks such as conglomerate.

Hydrologic Group (B to C) – Group B soils have moderate infiltration rates when thoroughly wetted, consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission. Group C soils have slow infiltration rates when thoroughly wetted, consisting

chiefly of (1) soils with a layer between 20-40" that impedes the downward movement of water or (2) deep soils with moderately fine to fine textures and a slow infiltration rate. These soils have a slow rate of water transmission.

Sedimentation Yield Potential (low) – Sedimentation levels of soil particles are expected to be minimal following management activities (Paulson, 1977).

Other soils that exist within the perimeter of the Murray Fire but outside of the proposed planning area include M13, P5, and P54 landtypes are listed in Table 7 (BAER 2002).

Table 7. Murray Fire landtype and total acres

Soil Type	Acres
P3	220.57
P54	114.13
P5	5.57
M13	1.26
Total	341.53

Characteristics of Ash Soils relating to Erosion Susceptibility

Infiltration and percolation are naturally very high in these soils. This, coupled with high water storage potential, means they have a natural resistance to surface runoff and attendant erosion. As water content declines below saturation, the increasing suction force lock the irregular shaped particles together and adds to their natural stability (Region 6 USDA-FS-Soils, 1986).

Key Issue: Soil Productivity

Measure #1 – Soil Compaction, Displacement, and Charring

Existing Condition

Soils within the fire perimeter exhibit varying amounts of detrimental soil conditions, such as areas of soil compaction and displacement, resulting predominantly from past logging activities. The project area was surveyed for detrimental soil conditions in the fall of 2002. Transects evaluating existing soil conditions were run using methods outlined in "Dealing with Soil Resource Issues"(Howe, 1998). Soils that fall in classes 3, 4, 5, and 6 are considered to meet Region 6 and Forest Plan standards for defining damaged soils (Region 6 Soil Quality Standards, FSM 2520). These soils have reduced infiltration and percolation rates along with reduced productivity. The Soils report contains additional information summarizing soil condition classes for the Murray Fire project area. The report is available upon request. Table 8 shows the estimated percentage of area in each harvest unit in detrimental condition classes.

Table 8. Percent of Project Units In Detrimental Soil Condition Classes 3-6

Unit 1	14.5%
Unit 2	23.8%
Unit 3	21.8%
Unit 4	14.5%

Table 9 lists the approximate number of acres by alternative and unit that would be subjected to restoration in order to meet Forest Plan and Regional soil guidelines.

Table 9. Approximate Restoration Acres - Alternative 2 and 3

Units	Alternative 2	Alternative 3
Unit 1	0.0 acres	0.0 acres
Unit 2	0.25 acres	0.4 acres
Unit 3	2.25 acres	2.3 acres
Unit 4 (Alt. 3 only)	0.0 acres	0.0 acres
Total Restoration Acres	2.5 acres	2.7 acres

Effects of the fire on soil resources included a mixture of burn intensities (low, moderate, and high) across the proposed project area (Table 10). Most of the organic litter layers on the soil surface were consumed in the fire, however, areas of low to moderate burn intensities have begun to develop a new organic litter layer resulting from needle cast. Areas that burned at a high intensity also had partial loss of the organic matter in the mineral soil as well as loss of the organic litter layer. Although some areas within the fire perimeter did experience a high burn intensity, field observations indicate very little of the area meets the definitions of detrimental burned soil as described in the Region 6 Soil Quality Standards. Soils are considered to be detrimentally burned when the mineral soil surface has been greatly changed in color, oxidizes to a reddish color, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer. The detrimentally burned soil standard applies to an area greater than 100 square feet, which is at least five feet in width (FSM 2520).

Table 10. Approximate percentage of proposed project area by burn intensity.

Low Burn Intensity	31%
Moderate Burn Intensity	30%
High Burn Intensity	39%

Transects testing for hydrophobic soil conditions were run using methods outlined by the USDA Natural Resources Conservation Service (USDA NRCS, 2000). Results for these tests, listed in Table 11, indicate approximate hydrophobic values in the planning area as low (77.2%), moderate (11.4%), and high (11.4%). Soil charring can occur when the soil becomes superheated causing loss of organic matter. Hydrophobic soil conditions can result from burned waxes and resins in the surface ash layer. For example, charring can occur on landings where large piles (concentrations) of slash are burned. Burning of hand and grapple piles does not typically result in detrimental charring due to the small concentration of fuels.

Table 11. Approximate Percentage of Murray Project Area by Hydrophobic Class

Low	77.2%
Moderate	11.4%
High	11.4%

Environmental Effects

Introduction

Compaction, Displacement, and Charring. Soil compaction may be defined as the packing together of soil particles by forces exerted at the soil surface, resulting in increased soil density. Roads, log landings, skid trails, and mechanical fuel treatments are the actions associated with timber harvesting that cause soil compaction. Soil displacement is movement or rearrangement of the soil profile adversely affecting the normal process of soil development (Soil Report, Deep EIS, 2003).

Alternative 1 - No Action

Under this alternative, existing land management practices would remain the same with no commercial timber harvest or rehabilitation measures taking place. Most Burn Area Emergency Rehabilitation (BAER) activities have already been completed.

Direct and Indirect Effects

Under the no action alternative, no management actions affecting soil resources would occur. The existing levels of detrimentally impacted soil would remain the same leaving soils to recover naturally over a longer period.

Potentially, additional detrimental soil conditions, primarily additional soil compaction and displacement, could occur due to unrestricted vehicle access in the southern half of the planning area due to the number and extent of existing roads that would remain open under the no action alternative.

Overtime, there would be an increase in the fuel loading of large diameter woody material due to snags decaying and falling. The future fuel loads would increase the long-term risk of wildfire, which has the potential to affect the soil resource from detrimental soil charring and cause hydrophobic soil conditions, which has the potential to increase overland flow, erosion, and soil productivity.

Alternative 2 - Proposed Action

Under the proposed action alternative, commercial harvest would take place on three units (1,2,3) totaling approximately 139 acres. New ground disturbance would be kept to a minimum using the use of existing skid trails and landings. The Beschta Report (1995) states, " Protect soils. No management activity should be undertaken which does not protect soil integrity." All post harvest units will meet Regional and Forest Plan Soil standards thru required soil restoration measures. Beschta also states, "Salvage logging should be prohibited in sensitive areas." The ID team recognized the need to protect sensitive/fragile areas (identified as areas of concern such as shallow, rocky soils) and excluded them during the unit layout. Fragile areas include scablands (shallow soil areas), elk wallows, and other isolated soil areas which exhibit sensitivities that require special care (Ochoco LRMP 4-197, 1989). As stated previously, severely burned areas are discontinuous and scattered within the Murray Fire area.

Direct and Indirect Effects

Detrimental soil compaction and displacement would occur mainly on skid trails and landings. Past activities have already contributed to existing levels of detrimental soil conditions within an existing landing and skid trail network (see Table 8). Additional disturbance would be limited because of the use of this existing network. A short-term loss of soil productivity on skid trails and landings is expected to result from harvest activities until the required soil restoration measures of scarification and seeding are implemented.

Regional and Forest Plan soil standards for soil conditions would be met through required post harvest soil restoration measures of scarification. This would result in a long-term increase in soil productivity where de-compaction occurs. Soil restoration would reduce compaction and hasten recovery of soil processes and nutrient cycling. Percolation and infiltration are increased allowing improved water and air transport, and penetration resistance is also reduced for vegetation roots. Conifers, brush, grasses, and forbs can more easily establish on these decompacted substrates. Seeding grass and planting conifers would also contribute incrementally to increased soil productivity from root growth and vegetative material in the soil.

Alternative 3

Alternative 3 proposes an expanded area of four harvest units, totaling approximately 157 acres. As in Alternative 2, existing skid trails and landings would be utilized keeping new ground disturbance to a minimum.

Direct and Indirect Effects

Detrimental soil compaction and displacement would occur mainly on skid trails and landings. Past activities have already contributed to existing levels of detrimental soil conditions within an existing landing and skid trail network (See Table 8). Additional disturbance would be limited due to the use of this existing network. A short-term loss of soil productivity on skid trails and landings is expected to result from harvest activities until the required soil restoration measures are implemented.

Regional and Forest Plan soil standards for soil conditions will be met through required post harvest soil restoration measures of scarification. This would result in a long-term increase in soil productivity where de-compaction occurs. Soil restoration would reduce compaction and hasten recovery of soil processes and nutrient cycling with increased filtration of water and air. Seeding grass and planting conifers would also contribute incrementally to increased soil productivity from root growth and vegetative material in the soil. Due to the additional acres proposed for harvest under this alternative, an increased amount of acres is slated for restoration then in alternative 2.

Key Issue: Soil Productivity

Measure # 2 – Soil Erosion

Existing Condition

The Murray Fire consumed the majority of the vegetation cover providing protection to the soil surface from increased erosion. The Beschta Report states, “Although post-burn soil conditions

may vary, depending upon fire severity, steepness of slopes, inherent erodibility and others, soils are particularly vulnerable in a burned landscape." The project area is predominantly on gentle terrain having slopes less than 15% with P3 soils that have low erosion potential. The amount of existing skid trails and landings provide for the opportunity to keep additional impacts to the soil resource at a minimum. Areas of high hydrophobic conditions are discontinuous and scattered.

Erosion and sedimentation calculations for the project area were estimated using the Water Erosion Prediction Project model (WEPP) (Elliot, Hall, Dayna, 2000). An interface of this model called Disturbed WEPP allows users to predict runoff and sediment yield. Disturbed WEPP predicts annual values for runoff, erosion, and sediment yields using site characteristics of climate, soil texture, local topography, plant community, and surface residue cover. Erosion is the process of soil particles being detached from the soil surface. Sediment yield is the amount of those soil particles actually being transported from the site.

The following table is from WEPP model projections based on existing conditions. Table 12 shows 30-year predictions that represent both the existing condition and Alternative 1, No Action.

Table 12. 30-Year Potential for Erosion & Sediment Yield (High Intensity Fire/Low Intensity Fire)

Return Period (Year)	Precipitation (In.)	Runoff (in.)	Erosion (t/ac)	Sediment Yield (t/ac)
30	29.25	0.43	1.53	1.15
15	22.53	0.34	1.13	1.12
6	21.66	0.11	0.88	0.48
3	19.61	0.00	0.46	0.00
1.5	16.85	0.00	0.08	0.00
Averages	17.81	0.05	0.43	0.16

When ash soils are adequately covered with vegetation, surface erosion is not a major problem. The gentle slopes found throughout most of the proposed project area reduce the probability of surface erosion occurring. Areas identified in the BAER report as at risk for increased surface soil erosion have had log erosion barriers installed to help catch and reduce transported sediments. Obliterating the berms, constructing water bars, and seeding have rehabilitated tractor lines around the Murray Fire. Field observations in March of 2003 indicate that log erosion barriers and tractor line rehabilitation have been successful in helping trap sediment on site.

Characteristics of Ash Soils Relating to Erosion Susceptibility

Infiltration and percolation are naturally very high in these soils. This, coupled with high water storage potential, indicates they have a natural resistance to surface runoff and attendant erosion. As water content declines below saturation, the forces of increasing suction lock the irregular shaped particles together adding to their natural stability (USDA, 1986).

Environmental Effects

Soil Erosion, Soil Report (Deep EIS, 2003): Soil erosion may be defined as the detachment and movement of soil from the land surface by wind, water, or gravity. Associated with erosion of soil from a particular site is the potential for subsequent deposition into streams, called sedimentation. Soil erosion is a natural process. Increases in soil erosion rates can have impacts on soil productivity and water quality. Effective ground cover is defined as the basal area of

perennial vegetation, plus litter and coarse fragments (greater than 2 mm in size), including tree crowns and shrubs in direct contact with the ground (Ochoco LRMP 4-196, 1989). Effective ground cover reduces the potential of surface soil erosion by protecting the soil surface from forces of wind and rain, thereby keeping the soil in place. Modeling of potential soil erosion and yield rates used the WEPP model. Factors not included in the model affecting the potential for soil erosion are soil surface roughness and protection increased by lopping and scattering of residual woody material.

Alternative 1 - No Action

Under this alternative existing land management practices would remain the same with no commercial timber harvest or rehabilitation measures taking place. Log Erosion Barriers have already been installed under Burn Area Emergency Rehabilitation (BAER) activities. These erosion barriers were installed to catch and reduce sedimentation. Obliterating the berms, constructing water bars, and seeding have rehabilitated tractor lines around the Murray Fire. BAER activities were completed that would increase water infiltration thereby reducing erosion and sediment yield from potential overland flow in the Murray Fire area.

Direct and Indirect Effects

Under the No Action Alternative, no harvest activities affecting soil resources would occur. Trees would not be planted that would have a long-term affect of establishing tree vegetation cover for the site.

There would be no accelerated rates of erosion due to management activities. The gentle slopes and low soil erosion hazard rating for the area as well as the log erosion barriers and tractor line rehabilitation completed under BAER have reduced the threat of a major erosion event. Modeling potential soil erosion and yield rates, using the WEPP model indicates a potential for estimated erosion and sediment yield rates of 0.43 t/ac erosion and 0.16 t/ac sediment yield from the soil profile following the wildfire (see Table 12). These are relatively low rates of erosion and sediment yield.

Woody materials would stay on site providing long-term surface protection to the soil as snags break, fall, and accumulate overtime increasing soil surface roughness.

No indirect effects would occur because timber harvest activities would not occur at this time.

Alternative 2 - Proposed Action

Under the proposed action alternative, commercial harvest would take place on three units (1,2,3) totaling approximately 139 acres. New ground disturbance potentially increasing erosion and sediment transport would be kept to a minimum through the use of existing skid trails and landings. Post harvest units would meet Regional and Forest Plan Soil standards through required soil restoration measures.

Direct and Indirect Effects

Modeling potential soil erosion and yield rates, using the WEPP model indicates a potential for accelerated but low erosion rates due to soil disturbance from management activities. Although actual soil erosion is expected to remain low, the model estimates 0.57 t/ac erosion and 0.07 t/ac

sediment yield from the soil profile following the wildfire and harvest activities. Factors affecting the potential for soil erosion not included in the model are soil surface roughness and protection increased by lopping and scattering of residual woody material as well as the occurrence of needle cast in areas of low to moderate burn severity. Table 13 represents WEPP model 30-year predictions for Alternatives 2 and 3.

Table 13. 30-Year Potential for Erosion & Sediment Yield (High Intensity Fire/Skid Trail)

Return Period (Year)	Precipitation (in.)	Runoff (in.)	Erosion (t/ac)	Sediment Yield (t/ac)
30	29.25	0.30	2.35	2.06
15	22.53	0.00	2.04	0.00
6	21.66	0.00	1.34	0.00
3	19.61	0.00	0.88	0.00
1.5	16.85	0.00	0.20	0.00
Averages	17.81	0.01	0.57	0.07

Table 14 shows the annual potential for erosion and sediment yield by unit for Alternative 2 in tons.

Table 14. Average Potential for Erosion (E) & Sediment Yield (S) by Unit (tons)

Unit	Potential Erosion	Potential Sediment
1	E-4.56	S-0.56
2	E-3.42	S-0.42
3	E-71.25	S-8.75
4	E-6.84	S-0.84

Adding each column, the total potential erosion estimated is 86.07 tons with sediment estimated at 10.57 tons. Although unit four would not be harvested under Alternative 2, the existing skid trails would be used to remove logs from unit one and some erosion/sediment yield would occur.

Soil erosion mitigations would include post-harvest soil restoration measures such as scarification and seeding of closed roads, skid trails, and landings. Scarification would reduce compaction, increase infiltration while seeding would increase ground cover, and protect the soil surface from erosion.

The duration of an increased erosion rate is dependant upon timing of the completion of post harvest soil restoration measures. Ideally, soil restoration activities will occur after harvest and before rain events, increasing permeability of the soil and decreasing the potential for erosion.

Alternative 3

Alternative 3 proposes an expanded area of four harvest units (1,2,3,4) totaling approximately 157 acres in order to increase the economic value and to take advantage of an existing landing in unit 4. As in alternative 2, existing skid trails and landings would be utilized keeping new ground disturbance to a minimum.

Direct and Indirect Effects

Estimated average soil erosion and sediment yield rates for Alternative 3 are the same as in Alternative 2 with estimates of 0.57 t/ac erosion and 0.07 t/ac sediment yield from the soil profile following the wildfire and harvest activities (Table 13). Again, factors affecting the potential for soil erosion not included in the model are soil surface roughness and protection increased by lopping and scattering of residual woody material as well as the occurrence of needle cast in areas of low to moderate burn severity.

Soil erosion mitigations would include post-harvest soil restoration measures such as scarification and seeding of closed roads, skid trails, and landings. Scarification would reduce compaction and increase infiltration while seeding would increase ground cover and protect the soil surface from erosion.

The duration of an increased erosion rate is dependant upon timing of the completion of post harvest soil restoration measures. Ideally, soil restoration activities will occur after harvest and before rain events, increasing permeability of the soil and decreasing the potential for erosion.

Table 15 shows the annual potential for erosion and sediment yield by unit for Alternative 3 in tons.

Table 15. Average Potential for Erosion (E) & Sediment Yield (S) by Unit (tons)

Unit	Potential Erosion	Potential Sediment
1	E-4.84	S-0.59
2	E-5.7	S-0.7
3	E-72.39	S-8.89
4	E-6.84	S-0.84

The estimated potential annual erosion for Alternative 3 is 89.77 tons and the estimated potential sedimentation is 11.02 tons for all units.

Key Issue: Soil Productivity

Measure # 3 – Nutrients and Biological Processes

Existing Condition

Soil nutrient levels in the project area are now lower than pre-fire levels. This occurs particularly in areas of high fire severity through the volatilization of soil nutrients, mainly nitrogen lost into the atmosphere. Sediment-bound nutrients such as phosphorous and calcium may be lost due to an increased post-fire erosion. The resulting loss of soil nutrients and minerals would reduce the productivity of the site until natural processes can bring the area back into a balanced state through the reestablishment of vegetation and soil microbial populations. Soil microbial populations would decrease after a burn, but would increase three to tenfold within a month due

to favorable growth conditions (USGS, 2000). These increased microbial populations are expected to aid in the restoration of pre-fire soil nutrient levels.

Environmental Effects

Excerpt from Soil Productivity and Nutrient Availability, Soil Report for Deep EIS, 2003: Soil nutrients tend to accumulate and cycle at or near the soil surface in organic horizons and feeder roots. At this location, nutrients are particularly vulnerable to disturbance and dislocation processes resulting in outright loss or reduced capacity for replacement (Harvey et al, 1989). The nature, amount, and distribution of disturbance to the soil surface are primary factors affecting nutrient cycling. Properly applied treatments, using either fire or machines, can be compatible with long-term nitrogen conservation (ibid).

Soil organisms decompose organic compounds and sequester nitrogen and other nutrients making them available to plants. Many organisms enhance soil aggregation and porosity, thus increasing infiltration and reducing runoff (Soil Biology Primer, USDA, NRCS, 1999).

Alternative 1 - No Action

Under this alternative, existing land management practices would remain the same with no commercial timber harvest or rehabilitation measures taking place. Most Burn Area Emergency Rehabilitation (BAER) activities have already been completed with the exception of cleaning a culvert near the 5800-550 rd and removal of part of the road prism for the spur road west of the 5800-573 rd.

Direct and Indirect Effects

Under the no action alternative no management actions affecting soil nutrient availability and soil microorganisms would occur. Soil productivity and nutrient recovery would depend on natural regeneration of under story plants and decomposition of onsite biomass to restore natural processes.

No indirect effects would occur because timber-harvesting activities would not occur at this time.

Alternative 2 - Proposed Action

Under this alternative, commercial harvest would take place on three units (1,2,3) totaling approximately 139 acres. New ground disturbance would be kept to a minimum through the use of existing skid trails and landings. The Beschta Report states, “Active reseeding and replanting should be conducted only under limited conditions.” Under the design criteria, seeding would be limited to rehabilitated areas on skid trails, landings, and closed roads using a seed mix developed by the district Botanist.

Direct and Indirect Effects

Harvest activities have the potential to disrupt or impede the natural recovery of soil nutrients and biological processes due to soil compaction and displacement as well as the removal of nutrient rich biomass from the harvest area. Implementing the required post harvest soil restoration measures would improve on-site soil conditions by decreasing existing levels of compaction and displacement. Lopping and scattering of residual woody material throughout the units would

enhance nutrient cycling by putting more biomass in direct contact with the soil surface leading to an increased rate of decomposition resulting nutrient rich organic matter on site.

Leaving trees less than nine inches in diameter leads to an increase in soil productivity as dead and dying trees decompose over time releasing nutrient rich organic matter back into the soil profile. This increase in availability of soil nutrients will boost plant production in the harvest area leading to enhanced soil conditions as a natural order is restored.

Alternative 3

Alternative 3 proposes an expanded area of four harvest units (1,2,3,4) totaling approximately 157 acres. As in Alternative 2, existing skid trails and landings would be utilized keeping new ground disturbance to a minimum.

Direct and Indirect Effects

Harvest activities have the potential to disrupt or impede the natural recovery of soil nutrients and biological processes due to soil compaction and displacement as well as the removal of nutrient rich biomass from the harvest area. Soil productivity is increased by the implementation of required post harvest soil restoration measures that will improve on-site soil conditions by decreasing existing levels of compaction and displacement. Lopping and scattering of residual woody material throughout the units enhances nutrient cycling by putting more biomass in direct contact with the soil surface leading to an increased rate of decomposition resulting nutrient rich organic matter on site.

Leaving trees less than nine inches in diameter leads to increased soil productivity as dead and dying trees decompose over time releasing nutrient rich organic matter back into the soil profile. This increase in availability of soil nutrients will boost plant production in the harvest area leading to enhanced soil conditions as a natural order is restored.

Summary of Direct and Indirect Effects

Alternative 1 has the least potential for increased effects on soil resources from harvest activity as no management activities would occur. However, Alternative 1 allows for no soil restoration to take place allowing detrimental soil conditions in the area to persist. Alternatives 2 and 3 have more potential for effects on the soil resources resulting from harvest activities. With the specified design criteria and mitigations, the harvest area would benefit in both the short and long term from soil restoration and road closures in the project area. The difference in restoration acres in Alternatives 2 and 3 needed to bring the project in line with Regional and Forest Plan standards are minor.

Cumulative Effects for Soil Productivity

Cumulative effects consider the combined effects of past, present, reasonably foreseeable, and proposed management actions.

Past timber harvest activities were designed with an emphasis on economics rather than resource protection resulting in an extensive skid and road system providing access to the majority of the area. Much of this area exceeds Regional and Forest Plan Standards for soil conditions. With the timber values mostly removed in past activities, this area received little attention in stand

redevelopment allowing for an increased fuel load. This ultimately leads to the intensities of the Murray Fire.

Grazing has occurred in the area for many years with records dating to 1930. This has had an impact on the riparian areas, water quality, and soil resources by compacting soils, stream bank degradation, and reducing effective ground cover available for sediment trapping, stream bank protection, and stream shade.

The Murray Fire was a stand replacement event. Some areas received intense heat and burned down to mineral soil. Transects evaluating hydrophobic soil conditions found the burned area had approximate values of 11% high, 11% moderate, and 77% low, with the high and moderate areas being discontinuous and scattered. The gentle slopes, low soil erosion hazard rating, log erosion barriers installed on areas of concern as well as the rehabilitation of the tractor line have reduced the threat of an erosion event.

Approximately 5,000 gallons of Fire-Trol LCG-R Fire Retardant (Chemonics, Inc., Phoenix, AZ) were dropped on the Murray Fire on July 23, 2002. A main component of this retardant is ammonium polyphosphate (a commonly used agricultural fertilizer). The close proximity of these retardant drops to the rehabilitated tractor lines could possibly provide a secondary benefit of increased fertility in the immediate area. This could occur as the retardant breaks down releasing nitrogen and phosphorous into the soil profile, which then would be available for plant growth. This has the potential of reducing the amount of sediment leaving the burned area thru increased ground cover on the rehabilitated tractor lines surrounding the burned area.

Presently, grazing is being closely monitored, especially in the riparian areas, to ensure an upward trend and to protect fish habitat and soil resources. Unrestricted access to the burned area by livestock would slow the rate of vegetation recovery. Currently, grazing would be limited to resting the burn area for the 2003 season as part of the Willow pasture's normal rest-rotation cycle. Grazing activities would resume in the 2004 season within the Willow pasture (which includes the burn area) under the current Allotment Plan.

Under the proposed action, with the soil restoration and pasture rest, future soil conditions would be improved leading to increased infiltration, less erosion and sediment yield, increased nutrient cycling, and ultimately higher production values. This is in keeping with the Beschta Report, which recommends, "Do not take actions which impede natural recovery of disturbed systems." A reasonably foreseeable projection of actions in the area would include:

The Sunflower Natural Fuels Project, which proposes to reduce hazardous fuel levels by prescribed burning and precommercial thinning. This will protect soil resources in the future from damage incurred from high intensity wild fires.

Riparian planting along Murray Creek to protect and improve water quality through increased vegetation for bank stability and protection from erosion.

The reintroduction of cattle grazing, under Alternatives 2 and 3, after resting the burned area for two years in order to allow vegetation recovery. Monitoring protocol would continue to ensure an upward trend in range conditions.

The cleaning of the culvert near the 5800-550 Road junctions during dry weather conditions. This would allow unrestricted flow and prevent possible soil erosion and sediment yield due to overland flow from an obstructed culvert.

The removal of the road prism at a class IV drainage crossing located on a spur road west of the 5800-573 Road in T16S, R26E, section 9. This would allow unrestricted flow and reduce the possibility of soil erosion and sediment yield resulting from overland flow.

Under the no action alternative, it is reasonably foreseeable to hydrologically close the 5800-551, 5800-575, 5800-573, and 5800-245 Roads upon completion of harvest. Where possible, water outlets would be directed toward existing log erosion barriers. Closure may include waterbars, felling trees into the prism, ripping, and/or re-contouring. All closure specifications would be designed by the district Hydrologist, Fisheries Biologist, and Soils Scientist to prevent erosion and sedimentation.

Alternative 1 - No Action

No additional soil resources would become detrimentally compacted or displaced due to harvest operations.

No biomass would be removed from the project area, which would lead to increased nutrient cycling and soil surface protection from accelerated erosion as woody materials would stay on site providing long-term surface protection to the soil as snags break, fall, and accumulate overtime increasing soil surface roughness and eventually providing nutrient rich organic matter back into the soil profile.

The risk of wildfire would increase as dead and dying woody materials accumulate on the soil surface with the potential of impacting future soil resources from detrimental soil charring and loss of organic matter leading to a potential of increased erosion and corresponding lost in soil productivity.

The existing detrimental soil conditions would continue to persist without the soil rehabilitation measures outlined in the action alternatives affecting long-term soil production.

Grazing is restricted within the burned area for one year (2003) as part of the Willow pasture's normal rest rotation schedule. Grazing would resume within the burned area in 2004.

Alternative 2 - Proposed Action

Required post harvest soil restoration leads to increased soil productivity by decreasing the amount of soil compaction and displacement. This increases water infiltration and percolation throughout the soil profile, which decreases the chance of losing nutrient rich soil from overland flow on the rehabilitated skid trails, landings, and closed roads.

Leaving trees less than nine inches in diameter provides nutrients and soil protection. This will increase nutrient cycling and therefore soil productivity over the long term. Woody materials would stay on site providing long-term surface protection to the soil as snags break, fall, and accumulate overtime increasing soil surface roughness and eventually providing nutrient rich organic matter back into the soil profile.

The risk of wildfire gradually increases but over a greater amount of time as there is less potential fuel due to the removal of dead and dying biomass that would otherwise stay on site. The Sunflower Natural Fuels Project would protect soil resources in the future by reducing potentially hazardous fuel loads.

Grazing is restricted within the burned area for two years (2003, 2004) to allow understory vegetation to reestablish to effective ground cover standards specified in the forest plan (Ochoco LRMP 4-196, 1989). Monitoring protocols would continue to ensure an upward trend in range conditions.

Alternative 3

Required post harvest soil restoration leads to increased soil productivity by decreasing the amount of soil compaction and displacement. This increases water infiltration and percolation throughout the soil profile, which decreases the chance of losing nutrient rich soil from overland flow on the rehabilitated skid trails, landings, and closed roads. The amount of acres slated for restoration is greater in alternative 3 compared to alternative 2 due to the increased number of acres harvested.

Leaving trees less then nine inches in diameter provides nutrients and soil protection. This will increase nutrient cycling and therefore soil productivity over the long term. Woody materials would stay on site providing long-term surface protection to the soil as snags break, fall, and accumulate overtime increasing soil surface roughness and eventually providing nutrient rich organic matter back into the soil profile.

The risk of wildfire gradually increases but over a greater amount of time as there is less potential fuel due to the removal of dead and dying biomass that would otherwise stay on site. The Sunflower Natural Fuels Project would protect soil resources in the future by reducing potentially hazardous fuel loads.

Grazing is restricted within the burned area, under Alternatives 2 and 3, for two years (2003, 2004) to allow understory vegetation to reestablish to effective ground cover standards specified in the forest plan (Ochoco LRMP 4-196, 1989). Monitoring protocols would continue to ensure an upward trend in range conditions.

Summary

The proposed action alternatives would have no adverse impact on the soil resources based on the above analysis for short-term direct, indirect, and cumulative effects. Soil restoration work would occur under the action alternatives to meet soil standards for detrimental soil conditions. Alternative 2 harvests fewer acres than Alternative 3 so fewer acres of soil rehabilitation work would be required to meet Regional and Forest standards. Under Alternative 2, approximately 2.5 acres of soil restoration work is required and in Alternative 3, approximately 2.7 acres are required to be restored.

Differences in soil nutrient and biological effects between the alternatives is reflective of the amount of biomass left on site to accumulate and the amount of harvest activities that have the potential to affect soil compaction and displacement. No Action leaves the highest amount of biomass on the site to fall down over time. Alterantives 2 and 3 leave trees under 9 inches in diameter to accumulate over time.

While the erosion rates are higher, more sediment is actually leaving the area under Alternative 1 with an estimated total of 24.16 tons compared with 10.57 tons (Alt 2) and 11.02 tons (Alt 3). Soil rehabilitation measures required under the action alternatives would bring existing soil conditions in line with regional and forest plan standards. Vegetation recovery and improved soil

conditions are expected to reduce the long-term trend in sediment yield. Therefore, sedimentation is expected to be lower under the action alternatives.

Estimations of erosion and sedimentation for the entire fire area (321 acres) were made for each alternative. These estimations reflect recovery trends of restored soil processes of infiltration due to rehabilitation work being completed. Alternative 3, while having the highest potential erosion rate has the lowest potential for sediment yield (Table 16) due to the higher amount of soil restoration.

Table 16. Annual Potential for Erosion & Sediment Yield for the Murray Fire (321 ac) by Alternative (tons)

Alternative	Erosion	Sediment Yield
1	147.66	51.36
2	162.95	38.85
3	164.93	37.23

Key Issue: Hydrology and Water Quality

Hydrology and Water Quality Measure #1 – Sedimentation

Existing Condition

The climate of the project area is characterized by a prolonged cool wet period from November through May, followed by a hot dry season, which normally extends from June though October. Average annual precipitation ranges from 17 to 19 inches, however has been very low (less than 10 inches) the last five years. Elevation within the proposed project area ranges from approximately 4,760 to 4,840 feet.

The Murray Fire Salvage Project is proposed to occur within the Middle South Fork John Day River 5th-field Watershed (HUC 1707020112) and the Sunflower Creek 6th-field Subwatershed (HUC 170702011223). The Middle South Fork John Day River Watershed is located on the southeastern slope of the Ochoco Mountain Range, drains to the east into the South Fork John Day River, and spans approximately 88,360 acres. The Sunflower Creek Subwatershed consists of 21% (18,540 acres) of the Middle South Fork John Day River Watershed, and the Murray Fire consists 1.7% of the Sunflower Creek Subwatershed.

Out of the 321 acres that the Murray Fire burned, 128 acres (approximately 40%) burned with high severity, 95 acres (approximately 30%) with moderate severity, and 98 acres (approximately 30%) burned with low severity. The high severity burn areas had high soil heating, consumed shrubs and left trees with no foliage or canopy. Moderate severity burn areas had moderate soil heating, consumed most shrubs and left some undisturbed tree canopy. Low severity burn areas had light ground char, partially consumed shrubs and small trees, and left the majority of larger tree canopies undisturbed (resembling a pre-commercial thin).

For those high severity burn areas that occurred within RHCAs or on slopes where the impacts of the fire could accelerate erosion and stream degradation, log erosion barriers were established. These barriers were charred, dead trees that were felled parallel to the contour and limbed on the underside to seal with the ground. A series of these overlapping barriers were established to act as sediment traps and to mitigate potential sediment delivery to streams by way of overland flow.

The project area includes four un-named, Class IV drainage systems, defined as intermittent/ephemeral, non-fish bearing systems with a defined channel. These Class IV channels have a total length of approximately 1.1 miles within the project area. As Class IV systems, these channels require a 50 ft riparian buffer, which is managed by Riparian Management Objectives (RMOs), as established by PACFISH (1995).

As no management is being proposed inside the riparian areas, measures have been established to provide the criteria for attainment or progress toward attainment of the riparian goals. These drainages are headwater streams, and therefore have relatively little contributing drainage area. Hydrology within these systems is primarily snowmelt driven with minimal base flow, depending on the annual climate conditions. Stream flow is characterized by great seasonal fluctuations, being abundant and flashy in the spring and diminishing rapidly to base flow levels during the summer. In the summer of 2002, base flows were not present, as annual precipitation levels were approximately 43% of average. All of the channels, with the exception of the most southwesterly stream (just inside the burn area perimeter), are in hydrologic equilibrium; hence all stream channels are neither aggrading nor degrading. A portion of the most southwest stream has degraded over time (primarily downcut) and is most likely the result of cumulative impacts from past management activities such as grazing, logging, and road construction.

The un-named creeks are tributaries to Murray and Sunflower Creek. Murray Creek is a Class IV system, yet has more contributing drainage area and intermittent flow is more prevalent than in the un-named drainages. Sunflower Creek is predominately a perennial stream fed by several other perennial, intermittent, and ephemeral channels including Porcupine Creek, Columbus Creek, Wildcat Creek, Cougar Creek, and Murray Creek. Most of Sunflower Creek is designated as a Class 2 stream (see Table 17).

Table 17. Miles of Stream Class within the Murray Fire Salvage Project Area and Miles of Stream Class for Murray and Sunflower Creeks.

Creek Drainage	Approximate Miles of Stream Class			
	Class 1	Class 2	Class 3	Class 4
Sunflower	1.0	4.2	2.2	7.5
Murray	0.0	0.0	0.0	1.6
Within Project Area	0.0	0.0	0.0	1.1
TOTAL	1.0	4.2	2.2	10.2

Within the Murray Fire Salvage Project Area there are four Category 4 areas (defined by the Ochoco N.F. as Class IV streams). These channels are located within a watershed that is not a Key Watershed. A Key Watershed is defined by PACFISH (1995) as a watershed that contains designated critical habitat for listed anadromous fish. Izee Falls, a natural fish barrier has segregated the upper reaches and tributaries of the South Fork of the John Day System as non-anadromous (see Fisheries Report). Therefore, all RHCA widths for the Murray Fire Salvage Project Area are 50 feet on each side of the channel.

Category 4 areas (seasonally flowing or intermittent streams, wetlands less than one acre, landslides, and landslide-prone areas) will consist of a riparian area that includes the extent of landslides and landslide-prone areas, or the intermittent stream channel and the area to the top of the inner gorge, or the intermittent stream channel or wetland and the area to the outer edges of

the riparian vegetation; or for Key Watersheds the area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest, or for watersheds not identified as Key, the area from the edges of the stream channel, wetland, landslide, or landslide-prone area to a distance equal to the height of one-half site potential tree, or 50 feet slope distance, whichever is greatest.

Sedimentation

Sedimentation and stream turbidity levels are expected to increase slightly in the Murray Fire area as a result of the high/moderate fire severity and the 2.6 miles of dozer line. However, measurable adverse effects from sedimentation may not be detectable, as mitigation measures and rehabilitation activities have been established (i.e. rehabilitating dozer lines and installing log erosion barriers). Most of the sediment concern will occur during spring runoff and rain on snow events, when the ground is saturated or frozen and overland flow occurs. The greatest potential for mobilization of sediment is expected to occur during the first year runoff event after a fire (Ice, 1995).

Decreased evapotranspiration, due to tree mortality from the fire, may also lead to water saturation of the soil (Walsh et al. 1992), which leads to increases in overland flow and sediment transport to streams (Megahan and Molitor, 1975). Canopy loss from the fire, can also have the same effect on overland flow. This extent of overland flow increase (i.e. sedimentation) is expected to decrease as grass communities re-establish. Under Alternatives 2 and 3, no cattle grazing is expected within the burn area for two years, giving grass communities time to establish and thrive. Additionally, BAER activities have included implementation of Log Erosion Barriers to mitigate sedimentation concerns. These barriers are expected to capture sediment prior to reaching stream channels.

Sedimentation is primarily affected by erosion from harvest, roads, and fire. Burn Area Emergency Rehabilitation (BAER) activities, such as installing Log Erosion Barriers (LEB) have been established to mitigate the sedimentation effects from the fire and, consequently, some of the problem road areas discussed later in more detail. These barriers were established where high severity burn areas occurred on floodplains and adjacent slopes, and are expected to capture sediment prior to reaching stream channels. Beschta et al. (1995) states, “Structural post-fire restoration is generally to be discouraged” and “Hard structures (in-stream and on land) are not generally modeled or sited on natural processes, and their ability to function predictably may be particularly low in dynamic post-fire landscapes.” Field observations in late February found evidence of overland flow and that some sediment had been mobilized and transported downslope. Transect monitoring revealed that 100% of log erosion barriers were effective; however, there was little evidence of overland flow.

In December 2002, there was approximately two feet of snow within the project area. This snow melted in late January and early February. Field observations in February found evidence of overland flow and that some sediment had been mobilized and transported down slope. Outside the transect areas, there was some evidence of overland flow and approximately 98% of the LEBs were effective in minimizing/stopping overland flow and trapping sediment. Approximately 2% of the LEB functioned for some time period (evident from sediment deposits behind the LEB) before water saturated the soil under the log and broke the seal. In all of the breeched cases, other downslope LEB were effective at stopping the overland flow prior to reaching the stream. McCammon and Hughes (1980) reported that these types of structures in the Bridge Creek

Watershed near Bend, Oregon trapped 1,600 cubic yards of sediment on the hillsides compared to 2 cubic yards of deposits at a critical water in-take.

In the Murray Salvage Area the P3 soils (consult soils report) have naturally high infiltration rates and high percolation. This coupled with high water storage potential, means these soils have a natural resistance to surface runoff and attendant erosion. The 5800-573 Road currently shows signs of concentrating flows. Rills and gullies are evidence that concentrated flows have traveled north down the northern most part of this road (toward the 5800-550 Road). The flow is concentrated to the road ditch on the 5800-550 Road where it is cross-drained and dispersed toward existing LEB. Field-observations reveal that the majority of the sediment from this source does not reach a channel. However, the possibility of large sediments input to the channel exists with the occurrence of a rare runoff event. There is also a spur road off of the 5800-573 Road that has a 3-feet fill crossing over the east fork of the most southwesterly stream. This crossing is below a dry meadow that has a channel with evidence of annual scour and deposition. This channel most likely flows only during spring snowmelt. Currently, there is no drainage structure for flow to bypass the road, which upon failure could potentially contribute a large amount of sediment to the stream system. Historically, the establishment of the 5800-551 Road led to compacted and displaced soils. With the road crossing a Class IV channel, there was likely a source of sediment input into the channel for several years until vegetation re-established. At this time, no sedimentation appears to be coming from this crossing, yet this road serves a direct avenue for transport of sediment to the channel.

The culvert on the 5800 Road (just north of the 5800-550 Road junction) has aggradation on the outlet end. From a hydrologic viewpoint, any mechanism, which generates the accumulation of backwater, should be eliminated. This pipe will drain approximately one third of the burn area so it should be clear of all possible fail sources. Cleaning around the pipe should alleviate this concern. Long-term erosion and sedimentation from these roads may occur over time as the barriers deteriorate.

Roads can be a source for surface erosion because their surfaces, cutslopes, fillslopes and associated drainage structures are usually composed of erodible material and are exposed to rainfall and concentrated surface runoff. System road density within the Sunflower Subwatershed is 3.03 mi/mi^2, while open road density is 2.34 mi/mi^2. These values meet Ochoco National Forest Standards and Guidelines. System road density within the Murray Fire Salvage Area is 5.20 mi/mi^2, while open road density is 3.10 mi/mi^2. Currently there are 0.025 miles of road within RHCAs in the Murray Area, thus the majority of roads are located outside RHCAs and are not currently adding measurable amounts of sediment to the channels.

Sedimentation due to cattle grazing comes in response primarily to the health of the adjacent slopes and cutbanks. No official cutbank surveys have been conducted within the fire area, however, the Class IV channels in this Project Area are dry during grazing season and are not utilized as much as other areas with perennial water. Cutbanks for Murray Creek (outside the project area) meet the Ochoco National Forest Plan, while Sunflower Creek (well outside the project area) show 41.4% alteration, which exceeds the Forest Standard of 20%.
Upon consultation with Dave Palmer (the district Soils Scientist) approximately 22% of the soils within the entire Murray Fire area are detrimentally disturbed (compacted, displaced, eroded, or severely burned) from past management activities. The majority of this value is from compacted and displaced soils from existing skid trails. From a hydrologic viewpoint, compacted soils can increase surface flows leading to erosion, and displaced soils can be a source of sediment transport and sedimentation to nearby streams.

Stream Temperature/Shade

The Murray Fire has already altered the majority of the shade producing vegetation in this project area. The Murray Fire did not accentuate stream temperatures as all channels within the project area are Class IV's and therefore do not flow water during the summer months when stream temperatures are of interest.

Environmental Effects

Sedimentation is the transport of fine soil particles from upland areas to stream channels. As stated previously, sedimentation is primarily affected by erosion from harvest, roads, and fire. Erosion may be accelerated by increased overland flows due to increases in soil compaction/displacement from past management activities such as harvest. Decreased evapotranspiration, due to tree mortality from wildfire may also lead to water saturation of the soil (Walsh et al. 1992), which may increase the potential for overland flow and sediment transport to streams (Megahan and Molitor, 1975). Decreased tree interception, due to canopy loss from wildfire, may also contribute to a higher potential for overland flow. Most of the sediment concern will occur during spring runoff and rain on snow events when the ground is saturated or frozen and overland flow occurs. The greatest potential for mobilization of sediment is expected to occur during the first year runoff event after a fire (Ice, 1995). The extent of overland flow increase (i.e. sedimentation) is expected to decrease as grass communities re-establish.

Roads can also be a source for concentrated surface erosion and sedimentation. Sedimentation effects from roads generally occur due to the road surface being highly compacted, serving as an avenue for concentrated overland flows and erosion.

Environmental effects of sedimentation include changes in channel morphology and adverse effects to water quality and fisheries. Sedimentation can directly damage the gills of fish, inhibit fry emergence, limit the depth to which photosynthesis can take place, and reduce fish habitat through geomorphic channel changes.

Alternative 1 – No Action

Under this alternative, existing land management practices would remain the same. This alternative proposes no commercial timber harvest, pre-commercial thinning, road construction, road closures, or rehabilitation, prescribed fire, or other management related projects. This alternative would be consistent with the Beschta et. al (1995) "approach" to let nature "run its course" after a wildfire. From a watershed perspective, salvage logging is not always detrimental, as rehabilitation activities may actually partially restore areas that may have been contributing to adverse effects before the fire (for example, soils may be ripped to alleviate compaction that existed above threshold levels prior to the fire). The Beschta et al (1995) conservative approach must be evaluated on a site-by-site basis to establish watershed concerns from anthropogenic activity.

As a separate project, BAER activities would continue to be monitored to evaluate the effectiveness of mitigating for possible adverse sedimentation effects due to the Murray Fire.

Above and beyond what was accomplished under BAER, this alternative would allow the Murray Project Area to naturally recover, as recommended by Beschta et al. (1995). As discussed under

the next paragraph on "effects," this approach would not be beneficial to watershed health, especially if BAER activities had not been implemented.

Direct and Indirect Effects

Short-term (2-3 years) sedimentation and stream turbidity levels are expected to increase slightly in the Murray Fire area as a result of the high/moderate fire severity and the 2.6 miles of dozer lines that were created during fire suppression activities. However, measurable adverse effects from sedimentation may not be detectable as mitigation measures and rehabilitation activities have been established. (i.e. rehabilitation of dozer lines and installing log erosion barriers).

This alternative would not mitigate the current detrimental soil disturbance. Areas that exceed the regional standard of 20% would continue to promote overland flow and sedimentation. Erosion on identified problem roads would continue to occur, continuing to increase the potential of sedimentation to streams (currently, log erosion barriers are in place, and mitigate some of this concern). The 5800-573 Road would continue to have the potential to input large amounts of sediment to the channel with the occurrence of a rare runoff event. The spur road off of the 5800-573 Road (that has a three foot fill crossing over a channel with no drainage structure) would also continue to be a possible sediment source upon failure of the road crossing. Historically, the establishment of the 5800-551 Road led to compacted and displaced soils. The 5800-551 Road would continue to serve as a direct avenue for transport of sediment to the channel. The culvert on the 5800 Road would not be cleaned to eliminate the possibility for a plugged culvert and road failure. Long-term erosion and sedimentation from these areas would continue to occur over time.

Under this alternative, the burned area would be rested from June 1 to September 15 during the 2003 season as part of the Willow pasture's normal rest rotation schedule. Grazing would resume in 2004. Allowing the vegetation to recover prior to the introduction of cattle is necessary to minimize impacts to soils (primarily cutbanks) and protect water quality. The indirect effect to sedimentation from cattle grazing depends upon vegetation recovery, and would be less if additional pasture rest were established.

Since there are no additional proposed activities within this alternative, there would be no additional direct or indirect sedimentation effects, besides what already exists in response to the Murray Fire, roads, and grazing. Under this alternative, the existing LEB would continue to mitigate some of the sedimentation concerns over the short term (<5 years). There is some potential for sedimentation effects, given a large storm event, from identified problem areas over the long-term (>5 years). As the LEB break down, there is also long term potential for sedimentation effects from identified areas, primarily roads.

Alternative 2 – Proposed Action

This alternative proposes to commercially harvest three units, totaling approximately 139 acres (0.7% of the Sunflower Subwatershed). All harvesting would utilize ground-based machinery. No new road building would occur, and existing skid trails would be utilized. No RHCA areas are within harvest units.

Since there would be no riparian harvest, this alternative would be consistent with the Beschta et al. (1995) report…to, "avoid salvage logging in sensitive areas, including riparian areas."

Under this alternative, the 5800-551, 5800-575, and 5800-573 Roads would be hydrologically closed and seeded. Closure would include waterbars, felling trees into the prism, ripping, and/or re-contouring. Where possible, waterbar outlets would be directed toward existing log erosion barriers. The seeding and planting approach may not be consistent with Beschta et al (1995) to, "allow natural recovery." However, seeding and planting would stabilize soils that may not promote natural recovery (see Silvicultural Report). Also, Beschta et al. (1995) reports that erosion would be a result of human intervention. Erosion in the Murray Project action alternatives would be expected to be smaller than in the No Action Alternative. This would primarily be a result of road closures and rehabilitating compacted and displaced soil areas to levels lower than pre-salvage.

Unit 1 would require approximately 600 feet of dead-skid to utilize an existing landing and comply with the visual corridor along the 5800 Road. Harvest would stay a minimum of 50 feet away from the Class IV channel, and would minimize disturbance to Log Erosion Barriers (additional information in Design Criteria, Appendix A of the Hydrology Report).

Unit 2 would incorporate hauling across one dry Class IV channel to access an existing unit landing. The crossing is already in place and would require no further excavation. This unit would also require one long skid trail paralleling the north side of the Class IV channel. The skid trail would be located on gentle slopes less than 5%. This trail would use existing disturbance, would be well outside the established RHCA, and would have Log Erosion Barriers between the trail and the creek. Logging slash would be scattered along the skid trail paralleling the Class IV to increase surface roughness and decrease overland flow.

Unit 3 would access existing skid trails and landings. Unit boundaries are at least 50 feet from the surrounding Class IV channels. Skidding would not occur up or down (in the bottom of) Class V swales, but would be allowed to cross.

Direct and Indirect Effects

This alternative would have no measurable direct sedimentation effects. All sedimentation effects would occur indirectly as a result of overland flow due to compaction/displacement, and less tree interception and evapotranspiration. Currently, all units have approximately 15-20% existing detrimental soil disturbance (see Soils Report), which is primarily due to compaction and displacement. Compacted areas serve as a source for overland flow due to low infiltration rates, while displaced soils serve as sources for sediment mobilization. There is expected to be minimal detrimental soil compaction and displacement (see Soils Report) as existing skid trails and roads would be utilized. There are no expected measurable adverse sedimentation effects from harvest activities under this alternative.

Harvesting may also reduce the amount of evapotranspiration and interception occurring, resulting in more water available at the ground surface for overland flow, thus increasing the potential for sedimentation. However, harvesting the dead and dying trees is not expected to measurably change the amount of evapotranspiration and would not alter the water budget beyond what has already occurred due to the fire. Harvesting will decrease the amount of tree interception, however, this is expected to be minimal, as most trees to be harvested have already lost their canopies. Tree harvesting from this alternative is not expected to have measurable adverse sedimentation effects to water quality.

To mitigate sedimentation concerns, several design elements have been established. Hydrology design elements directly or indirectly mitigate sedimentation concerns (see Alternative descriptions, Design Elements). In addition, Log Erosion Barriers have been established through BAER activities to mitigate possible concerns for sedimentation due to overland flow. With these established measures, there are no expected measurable adverse sedimentation effects in the short or long-term.

Alternative 3

This alternative proposes to commercially harvest four units, totaling approximately 157 acres (0.8% of the Sunflower Subwatershed). Units 1, 2, and 3 would be larger than in Alternative 2. Unit 1 would be eight acres, while units 2, 3, and 4 would be ten, 127, and 12 acres, respectively. All harvesting would utilize ground-based machinery. No new road building would occur, and existing skid trails would be utilized. All units would maintain a 50-foot minimum buffer on streams as established by PACFISH (1995) There would be no logging in riparian areas. This Alternative would have more area in skid trails than Alternative 2. Like Alternative 2, this alternative would hydrologically close and seed the 5800-551, 5800-575, and 5800-573 Roads. Closure would include waterbars, felling trees into the prism, ripping, and/or re-contouring. Where possible, waterbar outlets would be directed toward existing log erosion barriers.

Unlike Alternative 2, there would be no dead-skid in Unit 1, as Unit 4 would be added to this alternative. In addition, this unit would be expanded to the west to capture more timber volume. This expansion would remain well outside the designated RHCA. The remainder of the unit would be harvested as outlined in Alternative 2.

Unit 2 would be similar to that in Alternative 2. It would still incorporate hauling across one dry Class IV channel to access an existing landing. Under this Alternative, the long skid trail paralleling the north side of the Class IV channel would be extended to the west by approximately 200-300 feet. The trail would use existing disturbance, would be well outside the designated RHCA, and would have Log Erosion Barriers between the trail and the creek. Unit 2 would also be expanded to the west, on the north end of the unit, and slightly to the east. Logging slash would be scattered along the skid trail paralleling the Class IV to increase surface roughness and decrease overland flow.

Unit 3 would be similar to that in Alternative 2. As mentioned in the Design Elements (Appendix A in the Hydrology Report), skidding would not occur up or down (in the bottom of) Class V swales, but would be allowed to cross. The unit would be expanded around the headwater area of a Class IV channel and also north of the 5800-550 Road.

Direct and Indirect Effects

This Alternative would propose to add approximately 18 acres of timber harvest. An assumption was made that more area would be disturbed resulting in a higher potential for short-term indirect sedimentation effects from compaction, displacement, and overland flow. Also, due to more harvest acres, there would be less tree evapotranspiration and interception and more water available at the ground surface for overland flow.

Under this alternative, Unit 3 would include harvesting along the headwater area of a Class IV channel. This activity would have no sedimentation effects to water quality based on design criteria that will minimize skid trails in this area. However, the potential for sedimentation is

higher than in Alternative 2 due to harvesting in a headwater area and 18 additional acres of harvest being proposed.

Key Issue: Hydrology and Water Quality

Measure #2 – Stream Temperature

Existing Condition

Stream temperatures are of primary interest during summers when ambient air temperatures are highest and stream flows are lowest. Stream temperatures are monitored during the summer months. All of the channels burned through by the Murray Fire do not flow during the summer months and therefore do not contribute to downstream water temperatures. Additional information on stream temperature monitoring in downstream locations (outside the project area) is available in the full Hydrology Report (see Analysis file).

Environmental Effects

Stream temperatures are inversely correlated to stream shade. Environmental effects of less stream shade results in elevated stream temperatures. Due to the nature of water, high water temperatures result in lowered dissolved oxygen levels. Results of these effects can lead to lethal water temperatures for aquatic life. The critical time of interest for stream temperatures is summer when solar input is the greatest and stream flows are the lowest.

Direct and Indirect Effects of All Alternatives

The Murray Fire has already altered the majority of the shade producing vegetation within this project area. However, the Murray Fire did not accentuate stream temperatures, as all channels within the project area are Class IV and do not flow water during the summer time when stream temperatures are of interest. The perennial stream closest to the Murray Fire Salvage Area is approximately 0.5 to 1 mile away. Since there is no perennial flow within the project area, and no harvest within the RHCA under all alternatives, there are no expected measurable adverse effects to and or from stream temperature.

Cumulative Effects To Water Quality

Introduction

Past and present impacts to the Middle South Fork John Day River Watershed have occurred from road construction, timber harvest, cattle grazing, recreational activities, and wildfire. Roads and trails provide access throughout most of the watershed primarily for recreation, access to private and federal land, and scenic opportunity. Ownership within this 5th field watershed includes Forest Service, Bureau of Land Management, and private. Approximately 21% of this watershed is comprised of the Sunflower Subwatershed and is Ochoco National Forest Land.

The Murray Fire reduced canopy interception and subsequent vapor loss of precipitation, thus delivering a greater percentage of precipitation to the forest floor (Troendle and Olson, 1993). With less soil water depletion and canopy interception, more water is concentrated at the ground

surface than would be the case with vegetative cover. This results in a higher probability of overland flow than under pre-fire conditions. Increased overland flow could lead to increased sediment yield to streams and increase the magnitude and duration of peak flows. Increased peak flows and sedimentation could then increase the probability for stream degradation. Stable stream channels are capable of transporting sediment supplied from the contributing watershed.

Research by Hibbert (1965), Troendle and Olson (1993), Troendle and King (1985, 1987), and Troendle (1983) found there is no one specific threshold to how much a watershed can be harvested before a change in peak flow can be documented. The Ochoco Land and Resource Management Plan (LRMP) has identified an EHA threshold of 25% for the Sunflower Subwatershed based on the physical chacteristics of this area.

The EHA model was utilized to assess whether existing cumulative watershed effects might occur. This methodology is briefly described in the Ochoco LRMP (1991) and Anderson (1989, unpublished report). EHA was designed as a planning tool to aid the Forest Service in assessing the cumulative effects of land management activities (Bettinger et al., 1998).

The EHA methodology is defined as a watershed index of snowmelt and evapotranspiration rates relative to baseline condition where tree stands are considered fully canopied. The influential factor in computing EHA is the amount of area altered by land management activities or factors, such as wildfires or timber harvest. Additional information about EHA modeling can be found in the Hydrology report. Figure 6 displays the EHA values in response to the percentage of vegetative crown removal. Figure 7 displays the vegetative recovery rate factor, derived from local recovery rates. Full recovery ranges from 30 to 100 years, depending on the type of vegetative treatment.

EHA analyses are generally performed on the 5th field watershed scale. However, analyses may be performed on smaller/larger scales to put effects into context. For the Murray Fire Salvage Project, EHA was conducted on the 6th field subwatershed scale.

Figure 6. EHA Model Values Associated with Percent Crown Removal (Anderson 1989, Unpublished Report).

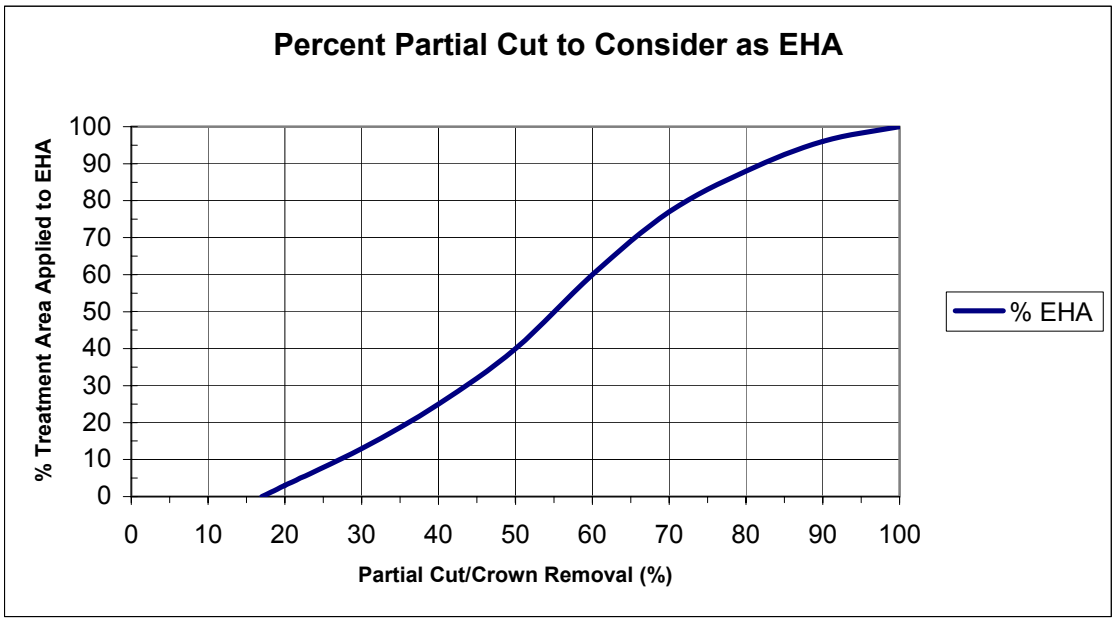
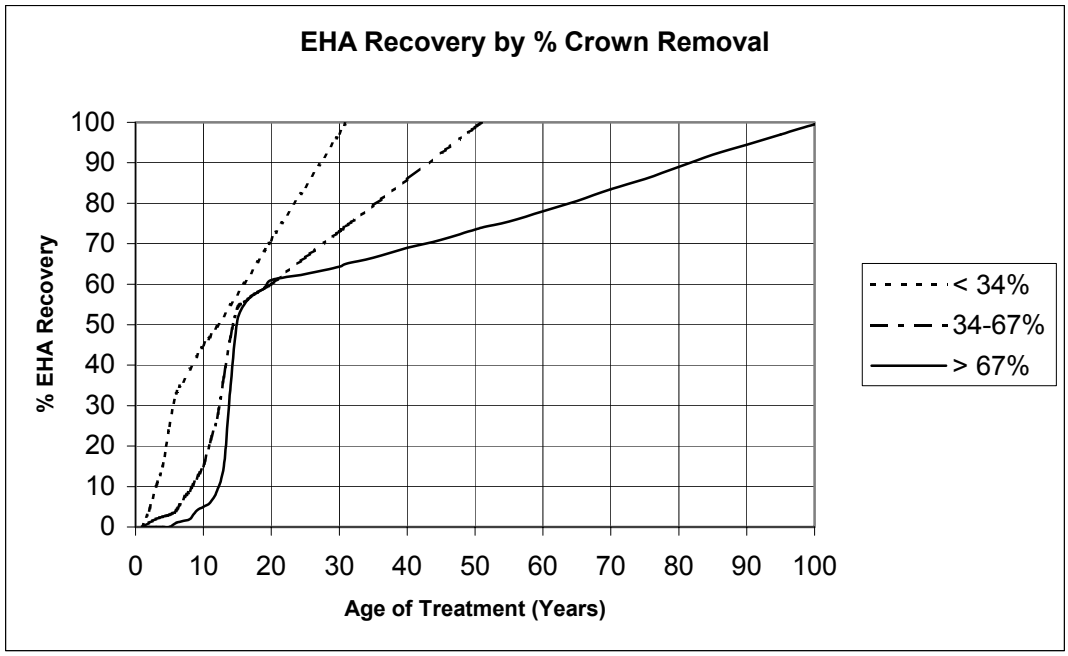


Figure 7. EHA Recovery by Percent Crown Removal (Anderson, 1989, Unpublished Report).



Before using the EHA methodology, its context of use was discussed with several hydrologists, including Research Scientist Dr. C. A. Troendle and Region 6 Hydrologist Bruce McCammon. Dr. Troendle and Bruce McCammon, agreed that using EHA in this context provides a general indicator of watershed health. However, stream channel condition and field observation should be used to verify actual health of the system (McCammon, 1999).

For modeling purposes, high severity burn areas were treated as regeneration cuts (clearcuts), moderate burn severity areas were treated as commercial thins, and low severity burn areas were treated as precommercial thins and or underburns. As stated previously, the Ochoco LRMP has identified an EHA threshold of 25% for the Sunflower Subwatershed. This is the threshold by which adverse watershed conditions could occur (i.e. increased magnitude and duration of peak flows).

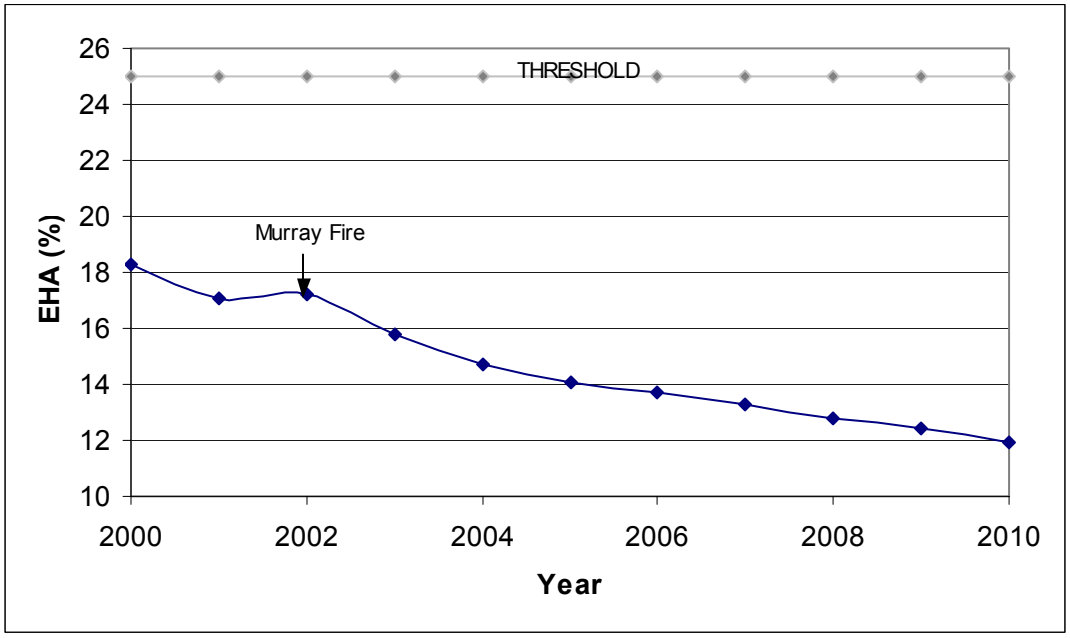
Alternative 1 – No Action

Cumulative Effects

The existing EHA value for the Sunflower Creek Subwatershed, prior to the Murray Fire was approximately 17%. After the Murray Fire, the EHA value slightly increased (by $1/10^{th}$ of 1%, which is within modeling error) yet was diluted by recovery elsewhere in the Subwatershed. Even without factoring in recovery, the effect of the Murray Fire would be an increase in EHA by 1.4%, still well below the established threshold level (Figure 8). EHA analysis demonstrates that there are no expected measurable cumulative effects (primarily from peak flows) to the Sunflower Subwatershed from Alternative 1. However, the potential for long-term sedimentation effects from the 5800-551, 5800-573, and 5800-575 Roads would persist over time because these roads would not be closed. In addition, existing detrimental soil disturbance levels would remain

near threshold levels (20%), adding additional potential for long-term sedimentation effects from overland flow on compacted and displaced soils.

Figure 8. Existing EHA Values (including the Murray Fire) from 2000 to 2010.



Nutrient flushes resulting from rapid mineralization and mobilization of nutrients from wildfire may affect water quality (Baker, 1988). This long-term potential would exist for all Alternatives. Calcium, magnesium, and potassium, when converted to bicarbonate salts and nitrogen (from fire), are susceptible to movement into streams by leaching or by overland flow. However, most of the increased available nutrients are taken up by primary production from plants and aquatic communities or bound to the soil, roots, or debris. Long-term effects to water quality due to nutrient flushes are not expected to have measurable adverse effects to water quality and aquatic life due to gentle slopes, mitigation and rehabilitation measures, flows occurring only during spring runoff, and the small fire area (when compared to the subwatershed scale). Nutrient concentrations downstream of the proposed project area appear to be in equilibrium.

Another existing potential long-term contributor to water quality degradation could be suppression retardant. Approximately 5,000 gallons of Fire-Trol LCG-R Fire Retardant (Chemonics, Inc., Phoenix, AZ) were dropped on the Murray Fire on July 23, 2002. According to this product's Material Safety Data Sheet (MSDS), it contains ammonium polyphosphate (a commonly used agricultural fertilizer), and minor amounts of attapulgite clay thickener, corrosion inhibitor, and iron oxide as a coloring agent. This product is not classified as a hazardous material by the U.S. Department of Transportation. Application of this retardant near streams has been shown to virtually have no impact on them, partly because there is a minimum of migration of chemicals from areas as close as three meters from the edge of a stream (Norris, 1978). However, this retardant could affect aquatic life if direct application occurs to streams. Degradation of this chemical is generally rapid, as available nutrients are taken up by primary production from plants and/or bound to the soil, roots, or debris. The MSDS states, "Use and disposal of this product, employing proper environmental control practices, should not cause a significant environmental impact." All retardant drops on the Murray Fire were approximately 400-500 feet from dry Class IV channels. Since there was no flow in these channels until

February of 2002, the retardant has had seven months to deteriorate. For these reasons, there are no measurable adverse cumulative effects to water quality expected from this activity.

Observations pre and post-fire reveal that there are no known chemical problems with water quality due nutrient flushes or retardant drops.

Alternative 2 – Proposed Action

Cumulative Effects

The EHA value would remain at approximately 17% yet may increase by less than 1% due to additional harvest acres; there are no expected measurable adverse effects to peak flows and in-channel scour from this Alternative. The potential for long-term sedimentation effects from the 5800-551, 5800-573, and 5800-575 Roads would not persist because these roads would be closed. Long-term sedimentation concerns due to compaction and overland flow would be minimized, as all units would reside below the 20% Regional Detrimental Soil Disturbance threshold (see Soils Report). Short-term potential sedimentation effects from harvest would be mitigated for (see Design Elements, Appendix A, Hydrology Report, Analysis File). Nutrient flushes and retardant effects would be the same as in Alternative 1.

Alternative 3

Cumulative Effects

The EHA value for Alternative 3 would remain at approximately 17%. There would be a minimal increase in this value over Alternatives 1 and 2. Not enough difference in harvest acres exists among the alternatives to show an EHA difference. As in Alternative 2, long-term sedimentation concerns would not exist as roads would be closed and soil standards met. Nutrient flushes and retardant effects would be the same as in Alternative 1.

Reasonably Foreseeable Cumulative Effects:

The Paulina Ranger District is currently proposing to implement the Sunflower Natural Fuels Project. The purpose of this project is to reduce hazardous fuel levels by prescribed burn and pre-commercial thinning. The EHA model was also used to predict effects due to reasonably foreseeable action. The proposed action for this project has been evaluated in the EHA model with results given in Figure 9.

Other reasonably foreseeable projects/actions, within this subwatershed, include the following;

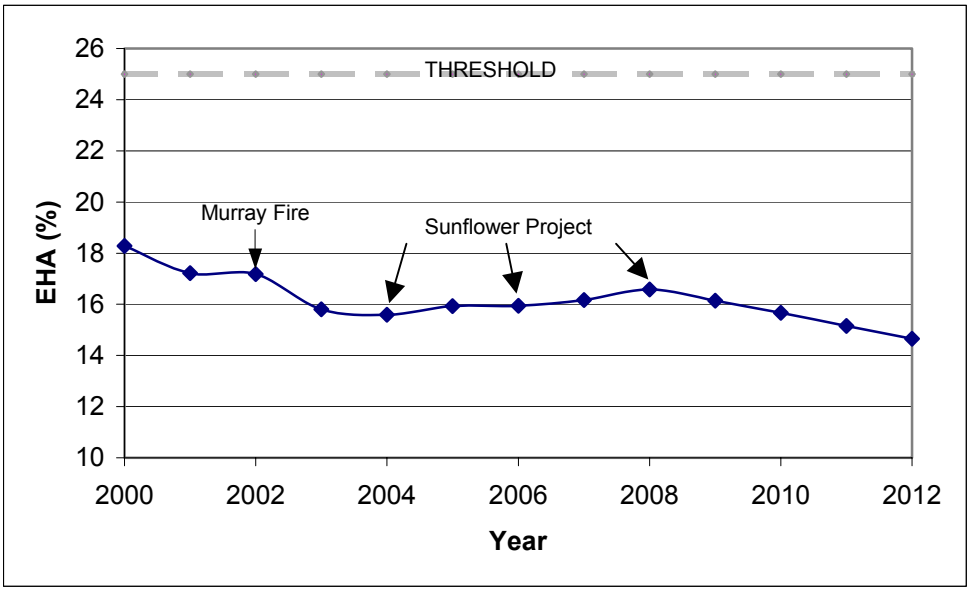
- Removing the road prism at a Class IV drainage crossing. The identified prism is located on a spur road to the west of the 5800-573 Road in T.16S, R.26E, section 9. This activity will incorporate removing approximately 15 cubic yards of fill and hauling it to the Sunflower Pit. Currently, there is no passage of water from the drainage above the road to the drainage below the road. With a large runoff event, there is good potential for road failure at this location, which would possibly send a large amount of road fill into Sunflower Creek and the South Fork John Day River. This activity would be implemented during dry weather conditions. Erosion control measures would be implemented upon completion of the project. There are no expected measurable long-term sedimentation effects to water quality from this activity. Also, implementation

during the summer should allow ample time for the soil to settle and allow vegetation to reestablish prior to the spring runoff.

- Cleaning the culvert near the 5800-550 Road junction. This activity would occur during dry weather conditions. For those reasons discussed in the previous paragraph, there are no expected measurable adverse effects to water quality from this activity.

- Re-connecting the stream and floodplain by removing part of the road prism on the 5800-551 Road stream crossing. This would be implemented upon completion of the Murray Fire Salvage Project. For those reasons discussed previously, there are no expected measurable adverse effects to water quality from this activity.

Figure 9. Cumulative EHA Values (including the Sunflower Project Proposed Action) from 2000 to 2012.



- Under the no action alternative, it is reasonably foreseeable to hydrologically close the 5800-551, 5800-575, and 5800-573 Roads. Closure may include waterbars, felling trees into the prism, ripping, and/or re-contouring. Where possible, waterbar outlets would be directed toward existing log erosion barriers. All closure specifications would be designed by the district Hydrologist, Fisheries Biologist, and Soils Scientist to prevent erosion and sedimentation.

- Riparian planting is reasonably foreseeable to occur along Murray Creek in out-year planning. This activity would aid in protecting and improving water quality, primarily stream temperatures and sedimentation.

- Under Alternative 1, Cattle grazing in the burned area would resume in 2004 after the normal one season of rest (June 1 to September 15, 2003) for the Willow pasture. Cumulative effects to water quality from grazing would continue to be monitored and

managed (see Soils/Range Report). In addition, updated Allotment Management Plans are expected to occur within the next couple of years. This process will integrate resource concerns.

Key Issue: Economics

Measure #1: Timber Volume Loss Through Deterioration

Existing Condition

Approximately 65% of the planning area burned at high intensity within the xeric ponderosa pine plant association group. Groupings of plant associations are described in the Ochoco National Forest Viable Ecosystem Management Guide (VEGM). This report will address the commercial forest portion of the fire area, which falls within the xeric ponderosa pine group

In general, sites occupied by the xeric ponderosa pine group border sagebrush scablands or juniper woodlands and have shallow soils. Usually, ponderosa pine and western juniper are the only trees species on the site. Sites are frequently steep south and west facing slopes where a scarcity of soil moisture limits both the establishment and growth rates of trees. In the Murray Fire Salvage area, the xeric pine group is found on broad ridge tops with gentle slopes of all aspects, interspersed with sagebrush scabland and juniper shrublands.

Fire return intervals for this group are felt to be strongly influenced by the dominant understory in a given plant association. It has also been proposed that ponderosa pine communities with shrub undergrowth had longer fire intervals than those communities with grass undergrowth (Gruell et al., 1982). Different ranges studied for specific plant associations within the xeric ponderosa pine group varied between five and 25 years.

Important insects for this plant association group are the mountain pine beetle, western pine beetle, and pine engraver beetle. Historically, these insects would create small scale, within stand disturbances, especially during dry years.

The dominant plant association within the project area is ponderosa pine/antelope bitterbrush/elk sedge. This plant association supports commercial timberland and is in the xeric ponderosa pine group. Additional information on other plant associations present can be found in the silviculture report, which is available upon request at the District office. This association supports a climax community of ponderosa pine and is considered warm and dry on an environmental gradient. Productivity is low; the average basal area is 89 square feet/acre with an average canopy closure of 43%.

Structure and Density

Prior to European settlement, a single story of large ponderosa pine trees at very low density dominated much of the landscape surrounding the planning area. The fire area itself and the surrounding area has very few large trees, approximately 1.5 per acre over 21 inches in diameter, and these are concentrated mostly on the northeast border of the fire edge, with a few others scattered throughout the fire area. All down logs and other woody material were consumed in the fire. The Ochoco Lumber Company of Prineville, Oregon previously owned most of the burned area. The land was exchanged in 1995 when it became U.S. National Forest land. The area had an estimation of three harvest entries when most of the larger overstory was removed through ground-based logging equipment.

Timber stand examinations were conducted in 2001 with results indicating there were two different ponderosa pine stand conditions existing prior to the stand replacement fire. One stand, 25 acres in size, was classified using the VEGM as being dominated structurally by late seral pole-sized timber with diameters ranging from 5.0 inches to 8.9 inches. The other stand, approximately 121 acres, was classified as late seral small sawtimber-sized timber with diameters ranging from 9.0 inches to 20.9 inches. Late seral, as used here, indicates the stands were dominated by ponderosa pine (the climax species), and should not be confused with stand age.

Historically, dry ponderosa pine dominated stands developed with frequent low intensity ground fires. The fires killed the small seedlings and saplings, keeping the stands at a low density of trees per acre and low canopy cover. Fire suppression allowed the build up of very thick litter layer and a dense understory of saplings to occupy this site. This resulted in a multi-storied stand with trees that acted as "ladder" fuels, carrying the fire into the crowns. The thick litter layer around the root collar of the tree, when burned, can damage the cambial tissue. Tree mortality is inevitable in this situation due to needle and bud death, and lethal heating of cambial tissue at ground level (Miller, 2000). The Murray Fire burned intensely under these stand conditions. One hundred and thirty-four acres were rated high severity burn, 97 acres as moderate severity, and the remaining acres low to none. As one would expect, the ponderosa pine dominated areas burned with a high severity. The juniper areas burned with moderate to low severity, and the grass and low shrub dominated areas burned with low severity or did not burn. The area along the 5800 Road, where backfiring took place as a part of fire suppression activities, was burned with a lower intensity killing approximately one third of the trees.

The fire caused extensive mortality and damage to most trees within the fire perimeter. The areas bordering juniper or shrub plant associations burned at slightly lower intensity leaving trees with some degree of surviving crown. A tree's ability to survive fire events depends on the length of the live crown killed by fire, expressed as a percentage of the total crown length (Dieterich, 1979). Trees with 30% of live crown were found to be able to survive as long as bole damage (damage to cambial tissue near ground level) was minimal. Ponderosa pines with less than 20% live crown are unlikely to survive. Crown scorch and cambial damage also cause physiological stress on a tree making them susceptible to insect and disease attack.

Stand inventories conducted in late September 2002 indicated wood boring insects, roundheaded wood borer and red turpentine beetles were already attacking the dead timber. The larvae of these insects bore into the sapwood, creating feeding and egg-laying galleries. While the wood is moist, the roundheaded borer will stay in the outer sapwood, but as the tree continues to dry out, they go deeper into the wood causing extensive damage to wood quality. The insects also carry blue stain fungus that turns the sapwood a blue or gray color. This stain does not affect the wood strength or quality but does reduce the value of the timber. Locally, studies within burned areas show that after the first year following a fire event, small timber is stained throughout the length of the bole and larger timber is stained on the butt log and the top log, leaving the middle log unstained. By the second drying period, the entire tree is blue stained (Kreachbaum, 2003).

Table 18. Stand Conditions

Stand Number	Acres	Management Area	Plant Association	Dwarf Mistletoe	Pre-Fire Structure Code[1]	Post-Fire Structure Code[1]	Burn Severity
8	25	MA-F26/F22	CPS222	High	L3b	E1	High
14	121	MA-F22	CPS222	Moderate	L4b	E1	High/Moderate

Stand #8 Units 1,2,4; Stand #14 Unit 3
L3b – late seral, pole timber, high density
L4b – late seral, small sawtimber, high density
E1 – early seral, seedling/saplings

Environmental Effects

Introduction

Predicting short-term mortality and deterioration after a fire involves knowledge of local environmental factors and professional judgment. Using scientific findings (Kimmey, 1955, Dieterich, 1979) and past experience, a determination of <30% live crown along with moderate to heavy cambial damage (>25% at the butt) and dwarf mistletoe infection were considered dead. Dwarf mistletoe was used as a compounding factor because the stand is heavily infested, reducing tree vigor and making recovery from fire damage less likely. Wagner states that the minimum requirement for ponderosa pine surviving a fire is <25% cambial injury and more than 20% live crown (green foliage).

Trees killed by fire will lose economic value over time due to stain, drying, and decay. The fire occurred in July, followed by several months of hot, dry weather, starting the deterioration process. The first economic loss occurs through blue stain introduced by roundheaded borers and red turpentine beetles. This stain does not weaken wood structure, but does decrease value and lumber grade. This process occurs fairly rapidly depending on tree diameter. Cracks in trees occur when dead trees lose moisture and shrink. Trees that have been killed by fire have less wood moisture than trees dying from other causes. Cracks provide openings for insects and fungi and reduce the strength of the affected wood (Hadfield and Magelssen, 1996). Fungi digesting cell walls and greatly reducing wood strength causes decay. Table19 shows the deterioration of ponderosa pine based on a study done in eastern Washington (Hadfield and Maglessen, 1996).

Table 19. Deterioration of Fire-killed Ponderosa Pine Trees

Years After Death	Bluestain Fungus	Cracks	Sapwood Decay
Year 1	95% of trees affected	10% of trees affected	10% of trees affected
Year 2	100% of trees affected	55% of trees affected	35% of trees affected
Year 3	100% of trees affected	95% of trees affected	65% of trees affected

This study also determined that 45% of the ponderosa pine in the study plots broke off close to ground level five years after being killed. The average dbh of trees in the study (14.2 inches) is larger than the average dbh of merchantable timber within the Murray Fire Salvage Area (<13 inches), therefore, deteriorating effects and tree fall may occur even more rapidly.

Alternative 1 – No Action

Direct and Indirect Effects

No timber volume would be removed, leaving all wood products to decay and ultimately fall to the ground. By the third year after the fire many trees with thick sapwood, like ponderosa pine, up to 10 or 12 inches in diameter, will begin to fall to the ground (Kimmey, 1955). It is estimated that by year 10, all but the largest trees will have snapped off at various heights or will have fallen. Kimmey also states that 50% of the wood volume of ponderosa pine will be deteriorated three years after the fire. Down logs will have both positive and negative effects on the site. Benefits include moisture retention and shading on site that can be used by recovering shrubs and forbs and help maintain long-term site productivity. A longer-term negative impact may occur in the event of another fire. Current fuel loading that will end up on the ground is outside the historical range due to the high numbers of trees on site. The greater the amount of available fuel, the greater the fire intensity in BTU's and the increase of difficulty of fire suppression (Everett, 1995 from Rothermal, 1983). A fire that occurs after tree regeneration is established will destroy the new timber stand.

Leaving dead trees on the site will encourage the build-up of insects that can then attack surrounding live trees. Trees that are alive but fire-damaged will be especially susceptible to future mortality from insect attack. Red turpentine beetles are already attacking dead trees in the fire area. By the second year, populations will increase greatly and can attack adjacent trees, and trees outside the fire area (Eglitis, 2003). Red turpentine beetles are attracted to large, weak, and injured trees. Normally, these beetles do not cause mortality (Hagel, et al., 1987). The live trees within the fire area are weakened and injured due to dwarf mistletoe infection, bole scorch and needle mortality. These trees will be susceptible to beetle attack and the probability of death is high due to compounding factors. Engraver beetles (*Ips* spp.) will also be attracted to the weakened trees in the burn area. Like turpentine beetles, they introduce blue stain fungus and can build up large enough populations to attack surrounding weakened trees causing mortality. This will result in further deterioration and loss of timber value beyond what was caused by the fire. Alternative 1 does not meet the project purpose and need to recover an economic value from damaged and fire-killed timber.

Alternative 2 – Proposed Action

Direct and Indirect Effects

This alternative proposes to harvest 139 acres of ponderosa pine killed by the fire. Three units were designated focusing on areas of high fire intensity where most trees had complete crown consumption by the fire. Scattered trees with >30% live crown and light cambial damage occur throughout the units, but would not be included in the timber sale. Dead and live trees would also be left to meet snag requirements for wildlife and visual concerns. More snags would be left for wildlife in this alternative than in Alternative 3. This alternative would recover timber value.

At this time, the economic value would be less than green timber due to the presence of blue stain. If harvested by the second year after the fire (late summer 2004), much of the structural integrity of the wood would be intact. As seen from Table 20, by the fall of 2004, much of the wood structure would be deteriorated. The entire sapwood cylinder would be stained, over half the trees cracked due to drying, and over a third would have decay. During the scoping process, the public asked the Forest Service to consider the findings of the Beschta Report (Beschta et al.,

1995), which advocates natural recovery after a wildfire with minimal post-fire management. The report states, "There is no ecological need for immediate intervention on the post-fire landscape." The need for immediate action is not based solely on ecology but mostly on economics. This need should be based on a site-specific basis and balanced with ecological effects, which is being done with the Murray Fire Salvage EA. The urgency is based on reducing the long-term fire hazard and removing wood before it decays, becoming less economically feasible to extract, and making further reductions in fuel loading more expensive to the American taxpayer (Everett, 1995).

The harvesting of dead and dying trees would reduce the potential for additional tree mortality and the deterioration of timber value through build-up of insect populations and subsequent future attacks. Trees within the fire area would be especially susceptible to insect attack due to current levels of dwarf mistletoe infection and fire injury. Areas outside the fire area may also be susceptible due to high density, competition stress, and disease occurrence.

There would be much fewer trees falling to the ground compared to Alternative 1. This would reduce the amount of fuel loading which would reduce the intensity of a future fire in the long-term. The issue has been brought forward, "that there is no evidence supporting the contention that leaving large dead woody material greatly increases the probability of reburn" (Beschta et al., 1995). The presence of high fuel loading does not increase the probability of reburn, however, high fuel loading will affect flame length, fire intensity and destruction of resources (Everett, 1995; Ice, 1995). Surviving trees, regenerated trees, and recovered herbaceous vegetation would be at risk under this scenario.

Alternative 3

Direct and Indirect Effects

Based on issues raised during the scoping process (economic benefit of salvaging valuable timber), Alternative 3 proposes to harvest 157 acres of ponderosa pine. This is an increase of 18 acres over Alternative 2. An additional unit is proposed and additional areas added to the other three units including timber that burned with moderate or light fire intensity, and areas with higher rock content in the soil. The same criteria for tree selection to harvest would be used as Alternative 2. A 6 inch top log diameter would be used in this alternative. This would increase the sale value since a higher price would be given at the mill for logs of this top diameter. Higher amounts of slash will be left at the landings. This alternative would recover the greatest timber value, and does the most to meet the purpose and need for the project.

This alternative would remove more dead and dying trees that could harbor large insect populations compared to Alternative 2. The additional unit proposed (unit 4) burned at varying intensities, leaving pockets of dead timber and areas that burned at a low intensity resulting in <50% crown scorch and little cambial damage at the butt. These trees will probably not die in the short-term as a result of the fire, but compounding factors of drought, dwarf mistletoe infection, previous competition stress and some loss of crown will make them susceptible to bark beetle attack. Removing the intermingled dead trees would reduce the likelihood of insect population build-up that could jeopardize their survival.

This alternative would further reduce the amount of fuel loading compared to Alternative 2, from more area harvested. Reduced fuel loadings will be especially important in unit 4 where the fire burned at varying intensities. Approximately 30% of the area did not burn or burned at such a low intensity that ground vegetation was not killed, leaving fine fuels intact. The addition of fine

fuels in the event of a future fire will increase fire potential and spread, but removing the future large down wood would reduce fire intensity.

Table 20. Amount of Proposed Timber Harvest and Value by Alternative

	Alternative 1	Alternative 2	Alternative 3
Maximum Amount of Timber Recovery Possible [1]	802 MBF	802 MBF	802 MBF
Amount of Timber Recovery Proposed	0 MBF	514 MBF	580 MBF
Amount of Timber Left On Site	802 MBF	288 MBF	222 MBF
Sale Value – Harvested by July 1, 2003 [2]	$ 0	$ 116,241	$ 148,799
Sale Value – Harvested by October 1, 2003	$ 0	$ 103,867	$ 132,943

1/ This figure represents all dead and dying timber within the fire area; it includes riparian areas, scabland ecotones, and areas of low fire intensity.

2/ The decline in sale value is due to the presence of blue stain fungus. Dollar values are based on Feb. 2003 log prices by diameter class and do not reflect net return to the Government.

Table 20 displays the economic effect of wood damage and deterioration in the short-term. October mill prices for trees going through one dry season drop approximately 11% just due to blue stain in the outer portion of the sapwood. By the summer of 2004, the timber will have no value at all. Small timber diameter, extensive blue stain in the sapwood and checking will prevent mills from accepting logs from the Murray Fire (see the Economic Analysis for the Murray Fire Salvage EA).

An issue brought out by Beschta et al. and supported by a number of responses to scoping this project involves leaving dead trees standing during salvage operations. Beschta states "…salvage logging must leave at least 50% of standing dead trees in each diameter class, leave all trees greater than 21 inch dbh or older than 150 years, and generally leave all live trees." Following these guidelines, approximately 292 MBF of additional dead timber would be left to deteriorate in Alternative 2, and 330 MBF would be left in Alternative 3. This would result in only 28% and 32% harvest of the total dead timber for Alternatives 2 and 3 respectively. Leaving 50% of each diameter class is arbitrary. The stands in the project area were carrying densities far above the historical range for dry ponderosa pine sites. More appropriate guidelines would be to leave historical amounts of snags and down logs (Everett, 1995). In the Murray project, all trees less than 9 inch dbh would be left and all live trees with >30% live crown and light cambial damage would be left standing. In addition, units 1 and 4 are in a visual retention area where 20-30 trees per acre of various sizes would be retained to meet visual requirements. The interdisciplinary team discussed the need to retain snags and down wood, and alternatives were designed to provide for them based upon consideration of the xeric ponderosa pine biophysical environment of the Ochoco National Forest.

Key Issue: Economics

Measure #2: Jobs Created

Existing Condition

The lumber industry, including secondary wood products, is a large contributor to the economic interests of the area, including the towns of Prineville and John Day, Oregon. Contributions to the local economies are made from direct employment and indirectly to local businesses through sales generated from forest workers. A socioeconomic assessment completed for the Ochoco National Forest (Cuddy, 2001) further discusses the economy of the local communities affected by resource management of the National Forest. This assessment identifies the income per capita for Grant and Crook counties as $20,819 and $21,168 respectively.

For the purpose of this analysis, timber related jobs created or maintained, per million board feet harvested (MMBF), is used based on the FY 1998 Timber Sale Program Information Reporting System (TSPIRS) report. Based on this report an average of 25 jobs are created or maintained per MMBF harvested. Reforestation activities, planting and animal damage control, over a number of years also create jobs and adds to the immediate local economy, including the community of Paulina. Based on past local production rates, an estimated four jobs are created for every 1,000 acres of reforestation activities.

Environmental Effects

Alternative 1 – No Action

Direct and Indirect Effects

No timber would be harvested and therefore no harvest related jobs created. No contributions would be made to help maintain current timber related jobs, a negative effect to the local economy. Approximately 802 MBF of dead and dying merchantable timber would be left to deteriorate on site. The area would not be planted, therefore, associated jobs from reforestation activities would also not be created, nor would the local economies benefit from commodity sales and other spending by forest workers. Long-term indirect effects of not planting, in this particular instance, may result in reduced maintenance of jobs in the future. The site may not regenerate fully to the site's potential, may be delayed many years, and may not meet the desired future condition for the stand. Future jobs from stand improvement activities may not be realized, such as precommercial thinning and intermediate harvest.

Alternative 2 – Proposed Action and Alternative 3

Direct and Indirect Effects

There would be contributions to the local economies from job creation and spending. In Alternative 2, approximately 139 acres would be harvested and approximately 514 MBF of timber removed. Alternative 3 achieves the greatest recovery of timber value and job support. Approximately 157 acres would be harvested and approximately 580 MBF of timber removed. Table 21 displays the number of jobs created by alternative. These jobs would occur over about four years as timber is harvested, milled and several years of reforestation activities take place.

Beschta et. al. brings up an issue concerning regeneration: "artificial reintroduction of species will circumvent natural successional changes….." In the case of the Murray Fire where tree mortality has occurred over 90% of the timbered area, available seed trees are few. Natural regeneration may come in from the edges and, eventually through time, become naturally regenerated. Planting, however, would shorten the successional pathway, and would better meet the desired future condition as outlined in the Ochoco Land and Resource Management Plan. Planting would provide shade for streams, reduce erosion, and would help maintain long-term site productivity. Native, locally adapted seedlings would be used.

Table 21. Comparison of Economic Benefit by Alternative

Alternative	Timber Recovered for Wood Products (MBF)	Direct Jobs Created or Maintained (harvest)	Indirect Jobs Created or Maintained (reforestation)
1	0	0	0
2	514	13	4
3	580	15	4

Cumulative Effects for Social Economics

Past actions affecting the timber resource resulted in high stand densities within the project area. Most of the land was acquired in a land exchange in 1995. A timber company previously owned the land, and had timber removed in several entries. Most of the large trees were removed during harvest, including those in riparian areas. Logging systems were designed with economic efficiencies of harvest as the objective, with little attention to other resources. This resulted in an extensive skid and haul road pattern throughout the project area. Follow-up stand improvement activities such as precommercial thinning and underburning were not done, resulting in abnormally high density and the spread of dwarf mistletoe infection. As a result, the effects of the fire, which occurred in July of 2002, were outside the normal range for dry ponderosa pine sites. Fuel continuity and ladder fuels caused a great amount of mortality within the fire area.

The proposed activities for the Murray Fire Salvage project would have little effect on the timber resource itself. The fire determined the outcome of stand management and left little decision for future management. The harvest of dead timber would create jobs and support local economies. No additional disturbance from logging systems is necessary; all landings, skid and haul roads are in place. Removing dead timber would help protect the planted stand from another fire event in the future.

Reforestation activities include seedling protection from big game and pocket gophers. These protection measures are usually done for a period of about four years. Big game will be attracted to the fire area due to new succulent vegetation, and they will often browse seedlings leaders in the fall. Plastic tubing would be installed over seedlings to make them unavailable for browsing by big game. Seedling buds and foliage would be protected which would aid in survival and growth of the tree seedling. Pocket gopher populations can build up rapidly after a wildfire, often supporting 20 individuals per acre. Gophers usually have one litter per year in dry sites, reproducing six to seven young, which disperse rapidly to new territory (Black, 1994). Gophers feed on seedling roots and tree cambium during the fall and winter when their preferred food is not available. Natural predators (mostly owls) do not exist in sufficient numbers to control gopher populations. Traps would be placed inside gopher runways and would result in a reduction of the population within the treated area of the plantation site.

Beschta et. al. recommend salvage logging be prohibited in sensitive areas including severely burned areas (areas with litter destruction), on erosive sites, fragile soils, riparian areas and steep slopes. Their reasoning being that logging may decrease plant regeneration by mechanical damage and changes in microclimate, and may accelerate erosion. According to McIver and Starr (2001) management effects on the post-fire environment depend upon specific features of the burned stands. The Murray Fire occurred on relatively flat ground with a logging system in place. Alternative 3 proposes the most harvest, 157 acres, or 49% of the area burned. On the watershed scale this equates to 0.8% of the acres in the watershed affected. No road building

would be necessary, no harvest would occur in riparian areas and soils within the fire area are rated low for erosion hazard. See the mitigation measures in Chapter 2 of the Environmental Assessment that are used to reduce or remove site specific effects of harvest activities. The Murray Fire did burn severely, with litter destruction. Approximately 55% of the ponderosa pine area was rated as severely burned. Everett (1995) states that for sites already outside the historical range of variability their ability to recover on their own may be impeded. Seed reserves may be depleted and the soil mantle damaged. Using low impact harvest equipment and staying on already disturbed skid trails would not permanently impair the site productivity. The Murray project area is a rhizomatous grass dominated site and species variability was fairly low due to closed tree canopy.

Foreseeable future actions include the Sunflower Natural Fuels project. This project involves chainsaw thinning and underburning to reduce stand densities and return fuel loading to more historic levels within the Sunflower Watershed. Stand management adjacent to the Murray project area is proposed to begin in 2005. There is no timber harvest proposed. Another action in the future may be planting ponderosa pine in the event the no action alternative is selected. Funding to do so would be requested and at some point in the future when appropriated funds may become available.

Additional Resource Effects

Wildlife Species and Habitat

The Murray Fire was very intense and resulted in a stand replacement fire in most of the ponderosa pine plant communities, killing virtually all the live trees within the fire perimeter. Major tree species in the burn area were ponderosa pine and western juniper, with primarily grass in the understory. Shrub species were present but did not make up a large percentage of the understory. A large portion of the burn area has had past silvicultural treatments.

Threatened, Endangered and Sensitive Species

Environmental Effects

There is one federally listed wildlife species known to occur on the Ochoco National Forest: the Northern bald eagle (*Haliaeetus leucocephalus*). The Ochoco National Forest is also within the listing range for the Canada lynx *(Lynx canadensis)*. There are nine additional wildlife species not listed for protection under the Endangered Species Act, which are on the Regional Forester's sensitive species list and are known or suspected to occur on the Ochoco National Forest. They are: peregrine falcon (*Falco peregrinus anatum*), bufflehead (*Bucephala albeola*), upland sandpiper (*Bartramia longicauda*), western sage grouse (*Centrocercus urophasianus*), gray flycatcher (*Empidonax wrightii*), tricolored blackbird (*Agelaius tricolor*), pygmy rabbit (*Brachylagus idahoensis*), Columbia spotted frog *(Rana luteiventris)* and California wolverine (*Gulo gulo*). The project area only contains marginally potential habitat for the California wolverine and does not contain habitat for the other above mentioned species. The California wolverine is discussed below.

Ten of the eleven threatened or sensitive species are not addressed further. The ten species were dropped from consideration because they either do not use forested landscapes or because they are dependant upon forested vegetation that has been established for a time period and therefore no habitat is present within the analysis area. The Murray Fire removed any habitat that may

have been present for these species and the action of salvage harvest of dead trees would have an effect determination of **no impact** upon these species. Additionally, effects to the Canada lynx (one of the ten) will not be further discussed because based upon the best available scientific data, Canada lynx and its habitat are currently not present within the analysis area or on the Ochoco National Forest and therefore a determination of **no effect** to Canada lynx is expected from this activity. (Ruediger, etal 2000, Ruggerio et.al. 1999, Verts and Carraway 1998, McKelvey and Aubry 2001). Effects to the Northern bald eagle will also not be discussed further because the project area does not contain habitat suitable for any phase of the eagle's life processes. The project area is a long distance from suitable foraging habitat, the burned trees are not desirable nesting habitat, and the area post burn does not provide habitat suitable for winter roost sites. The California wolverine is the only species analyzed for effects from this project because of its extreme sensitivity to human presence.

Alternative 1 – No Action

Direct and Indirect Effects

There would be no activities that would change the current habitat or vegetative natures of the 321 burned acres in the Murray Fire area or have any direct or indirect affect to California wolverine or their habitat within the project area. Therefore, there would be **no impact** to the California wolverine in the project area.

Alternative 2 – Proposed Action and Alternative 3

Direct and Indirect Effects

California wolverines may use the area and the additional amount of human disturbance related to the proposed salvage logging may alter their movement patterns. The amount of wolverine use in the area is expected to be low to non-existent because the project area contains only marginal habitat due to a high road density, heavy commercial and recreational use, and the lack of denning habitat near-by (isolated, densely forested north-facing slopes). The quality of habitat in the project area was further reduced as result of the Murray Fire. The fire reduced canopy structure and consumed the majority of existing downed wood. However, the effects of the fire may be offset by the increase in big game carrying capacity due to increased forage production for elk. An increase in elk populations could provide an increased winter carrion source.

Cumulative Effects

Over time, timber harvest and road development have modified habitat, increased road densities, and increased the amount of human presence. The Middle South Fork John Day River watershed is highly roaded with an open road density of 2.17 miles per square mile. The planning area is also highly dissected and fragmented by scablands. Road locations are generally along forested stringers usually associated with riparian areas. An analysis of the planning area indicates that over the past 20 years there has been a relatively consistent level of harvest activity and human presence within this area. The action alternatives would basically maintain this level of activity.

Wolverines appear to be intolerant to land-use activities that fragment their habitats in a permanent way, such as agriculture and urban and industrial development (Ruggiero et al., 1994). The proposed actions do not include these activities and would not permanently fragment wolverine habitat. Refugia exists on the Paulina Ranger District north of the 2630 Road, in the Rock and Cottonwood Roadless areas, and within Black Canyon Wilderness, where little human use occurs except during hunting season.

Another habitat component required by wolverines is an abundance of big game carrion as a primary food source (Copeland, 1996). Beginning in 1980, ODFW population estimates for Rocky Mountain elk within the Ochoco Unit were 400 animals. Mule deer were estimated at 13,500. In 1990, the estimate for elk was 1,800 and 13,300 for deer. In 2001, elk were estimated at 5,200 and deer at 18,300 animals. Since the 1980s, the populations of big game have increased within the Ochoco Unit. During big game hunting seasons (August through November), there is an increase for human presence within the unit. Generally, this increase includes overland pedestrian travel and motor vehicle use of roads. Since 1980, road closures during hunting season reduce the open road density to 1 mile per square mile. This closure has likely been beneficial to wolverines. Assuming no future treatments occur, habitat would increase over the next 50 years as portions of the burned area gradually re-establish as a forest condition.

The determination: A "**May Impact Individuals or Habitat, But Will Not Likely Contribute To A Trend Toward Federal Listing or Loss of Viability to The Population Or Species**" for the California Wolverine and it's habitat for alternatives 2 and 3 was reached through the following rationale:

- Wolverines have been documented through unconfirmed reports on the Paulina Ranger District.
- Reproductive habitat is a limiting factor within the planning area, but alternatives do not propose to reduce this habitat.
- Big game populations are increasing within the Ochoco Wildlife Management Unit.
- Harvest activity levels have been sustained over the past 20 years, and the alternatives would not greatly increase this level above the present levels.
- Human presence and road densities have increased steadily over the last 20 years; however, permanent road closures and the Rager area road closures have mitigated some of these effects and none of the action alternatives propose to increase this road density.
- The wolverine is a widely distributed species and localized effects from this project are not great enough to the entire population to contribute to a trend toward federal listing or cause a loss of viability to the population or species.

Management Indicator Species

1. Pileated Woodpecker

Environmental Effects

The Pileated woodpecker is a Management Indicator Species (MIS) listed in the Ochoco National Forest Land and Resource Management Plan (LRMP EIS 3-21, USDA Forest Service, PNW, 1989). Observations of pileated woodpecker foraging activity and audio and visual observations are scarce within the Middle South Fork John Day River watershed compared to the rest of the Paulina Ranger District. This is due to the lack of large diameter green trees and snags. Using the Viable Ecosystems Management Guidelines (VEMG), and the WILDHAB excel model, the historic range for pileated reproductive habitat within the Middle South Fork John Day River watershed ranges from a low of 7,027 acres to a high of 14,432 acres. Currently, there are 3,635 acres of reproductive habitat for the pileated woodpecker within the Middle South Fork John Day River watershed. Reproductive habitat is currently below the historic range of variability (HRV). As specified in the Forest Plan, 300-acre blocks were designated for pileated woodpecker reproductive habitat (MA-F6 Old Growth). Within the Middle South Fork John Day River watershed there are three Forest Plan designated old growth areas, totaling 673 acres. Suitable

reproductive habitat is generally defined as mixed conifer stands that meet multi-strata LOS definitions.
Because of the high intensity fire that occurred on Murray Flat, no pileated woodpecker reproductive habitat occurs within the project area. These birds require a green and dense conifer canopy with true firs species as part of the canopy component, which is absent in the project area. It is possible that low value foraging habitat is present because of the large numbers of dead trees.

Alternative 1 – No Action

Direct and Indirect Effects

Snags would remain at present levels providing low quality foraging habitat for the occasional pileated woodpecker that may frequent the area. Foraging habitat quality would increase over time as the fire-killed trees fall and as the fire-related insect activity decreases. The majority of snags are expected to fall by 40 years and by 80 years the majority of all snags within the Murray Fire will have fallen. During this same time period, the amount of green tree canopy will increase. Because pileated woodpeckers are hesitant to venture out of densely forested conditions and because these birds will make use of down logs and stumps, habitat values for this alternative will increase over time.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Alternative 2 would harvest 139 acres of burned trees and maintain all snags present on 79 acres of ponderosa pine plant associations and all snags present on 85 acres of juniper plant associations. This alternative would not affect pileated woodpecker reproductive activities since the bird requires dense live tree canopies along with snags for reproductive activities and this alternative does not reduce the amount of green tree habitat in the watershed. This alternative may have a slight negative long-term effect on pileated woodpecker foraging activity by removing snags that could provide a food source after live trees have regenerated to the point of providing security cover for the bird to feed in. The alternative would not affect pileated woodpecker foraging activity in the short term, since the project area is not currently suitable foraging habitat.

Alternative 3

Direct and Indirect Effects

Alternative 3 would harvest 157 acres of burned trees, maintain all snags present on 61 acres of ponderosa pine plant associations, and all snags present on 85 acres of juniper plant associations. This alternative would not affect pileated woodpecker reproductive activities since the bird requires dense live tree canopies along with snags for reproductive activities and this alternative does not reduce the amount of green tree habitat in the watershed. This alternative may have a slightly more negative long-term effect on pileated woodpecker foraging activity than alternative 2 by removing more snags that could provide a food source after live trees have regenerated to the point of providing security cover for the bird to feed in. The alternative would not affect pileated woodpecker foraging activity in the short term, since the project area is not currently suitable foraging habitat.

Cumulative Effects

There has been a long history of management activities within the planning area. Past timber harvest activities selectively removed the over story which was dominated by economically valuable live and dead large diameter ponderosa pine. Currently, there is a lack of large tree structure within the planning area. Annual firewood gathering combined with hazard tree reduction along roads has likely reduced snag levels below standards within 100 feet of all roads. The main prey species important to the pileated woodpecker, the carpenter ant, utilizes both snags and down logs. This data suggests that prey availability for pileated woodpeckers is also deficient and is not meeting potential because the amount of habitat now available is below HRV quantities. Active management has resulted in the Middle South Fork John Day watershed being deficit 3,392 acres of suitable reproductive habitat below what probably existed historically. The proposed activities in this project would not change these cumulative effects, since the project does not treat areas that are pileated woodpecker reproductive habitat.

2. Primary Cavity Excavators (including Northern flicker)

Environmental Effects

Primary cavity excavators are Management Indicator Species (MIS) listed in the Ochoco National Forest Land and Resource Management Plan (LRMP EIS 3-21, USDA Forest Service, PNW, 1989). The pileated woodpecker has already been previously discussed. The primary cavity excavator MIS group includes birds that feed primarily on dead wood insects. This list of MIS species includes a total of 15 birds that are listed below (Thomas et al., 1979). The species with an asterisk (*) are also dead wood insect users.

Common Flicker	Lewis' Woodpecker*	Red-naped Sapsucker*
Williamson's Sapsucker*	Hairy Woodpecker*	Downy Woodpecker*
White-headed Woodpecker	Black-backed Woodpecker*	Three-toed Woodpecker*
White-breasted Nuthatch*	Red-breasted Nuthatch*	Pygmy Nuthatch*

Beschta et al. (1995) suggested leaving at least 50% of all burned trees remaining on site for recovery of many ecosystem components including wildlife. This was a course estimate of needs of different dead wood habitat users. Newer and more exact science is available through the recently released draft of the Decayed Wood Advisor (DecAID) by Marcot et al. (2002). This work is an advisory tool to help land managers evaluate effects of forest conditions and existing or proposed management activities on organisms that use snags, down wood, and other wood decay elements. This publication relates the abundance of dead wood habitat both snags and logs, to the frequency of occurrence of various wildlife species that require dead wood habitat for some part of their life cycle. This publication also includes information on primary cavity excavators as well as a host of other organisms that use dead wood habitat. DecAID shows levels based upon "percentage of tolerance." Basically this tolerance can be viewed as representing levels of "assurance" or confidence of providing for a particular species. Information is given at the 30, 50 and 80 percent tolerance levels. Following is data from the ponderosa pine/Douglas fir habitats for recently burned areas.

The following tables have synthesized data used to create the cumulative species curves for wildlife use of snag densities from various studies for the Ponderosa Pine/Douglas fir Wildlife Habitat Type and Open Canopy Structural Condition Class in recent post-fire habitats (from Marcot et al., 2002).

Table 22. Cumulative species curves for wildlife use of snag densities: Snag size: > 9.85 inches

Species	30% t.l. Snag Density (#/acre)	Species	50% t.l. Snag Density (#/acre)	Species	80% t.l. Snag Density (#/acre)
BBWO	62.2	BBWO	88.3	BBWO	126.1
HAWO	12.7	HAWO	41.8	HAWO	85.3
LEWO	9.5	LEWO	24.8	LEWO	48.1
MOBL	6.8	MOBL	29.7	MOBL	63.9
NOFL	5.4	NOFL	29.8	NOFL	66.4
WEBL	9.2	WEBL	32.1	WEBL	66.5
WHWO	20.0	WHWO	51.4	WHWO	95.5

Table 23. Cumulative species curves for wildlife use of snag densities: Snag size: ≥ 19.7 inches

Species	30% t.l. Snag Density (#/acre)	Species	50% t.l. Snag Density (#/acre)	Species	80% t.l. Snag Density (#/acre)
LEWO	0.0	LEWO	6.2	LEWO	16.1
MOBL	0.0	MOBL	12.4	MOBL	38.0
NOFL	2.2	NOFL	17.4	NOFL	39.6

DecAID predicts the following species will use recently burned ponderosa pine/Douglas fir vegetation: Black-backed woodpecker (BBWO), Hairy woodpecker (HAWO), Lewis' woodpecker (LEWO), Mountain bluebird (MOBL), Northern flicker (NOFL), White-headed woodpecker (WHWO), and Western bluebird (WEBL). The range of snags by species is shown in the above tables, but basically range from a low of 5.4 snags/acre ≥ 9.85" at the 30 percent tolerance level for the Northern flicker to a high of 126.1 snags/acre ≥ 9.85" at an 80 percent tolerance level for Black-backed woodpecker.

Alternative 1 – No Action

Direct and Indirect Effects

The No Action Alternative would retain all snags in juniper woodland communities and approximately 83 snags per acre ≥ 10 inches diameter at breast height (dbh) or 17,347 total snags on ponderosa pine plant communities ≥ 10 inches dbh. Of these snags, approximately 4 per acre are ≥ 20 inches dbh or 836 total large snags ≥ 20 inches dbh. These estimates were derived using stand exam data taken on site within the project area. Under this alternative, habitat is provided for all species predicted by DecAID to be using the project area. Habitat is provided at the 80% tolerance level for Hairy woodpecker (HAWO), Lewis' woodpecker (LEWO), Mountain bluebird (MOBL), Northern flicker (NOFL), and Western bluebird (WEBL) for total snags ≥ 9.85 inches dbh and at the 50% tolerance level for the Black-backed woodpecker (BBWO) and White-headed

woodpecker. Due to the previous harvest history of the area where the Murray Fire occurred, large trees were scarce before the fire, and now post fire, large snags are scarce. The no action alternative would provide habitat at the 30% tolerance level for the Lewis' woodpecker (LEWO), Mountain bluebird (MOBL) and Northern flicker (NOFL) for snags ≥ 19.7 inches dbh. This alternative also meets LRMP standards for primary excavators.

Alternative 2 - Proposed Action

Direct and Indirect Effects

This alternative proposes to salvage log 139 acres of ponderosa pine plant communities (and 9 acres of miscellaneous plant communities) on the burned area. Seventy-nine acres of ponderosa pine community would remain un-harvested. This un-harvested area is scattered throughout the project area in a sufficient distribution to meet LRMP standards for maintaining snag habitat every 40 acres. This would retain 6,557 total snags ≥ 10 inches dbh in the project area of which 316 snags would be ≥ 20 inches dbh. Additionally, because of the size of unit 3 and the desire to maintain habitat for the smallest home range primary cavity excavator (pygmy nuthatch, 10 acre home range), an additional 20% of LRMP standard for the harvested area would be left as islands of snags in unit 3. An additional 62 snags ≥ 10 inches, of which 3 would be ≥ 20 inches, would be left in unit 3 to provide habitat in the large unit.

Calculating snag density for the 209 acres of ponderosa pine plant community, this equates to 31.7 snags per acre, of which 1.5 snags per acre would be ≥ 20 inches dbh for the entire project area, which exceeds LRMP standards. Under this alternative habitat is provided for all species predicted by DecAID to be using the project area except the Black-backed woodpecker (BBWO). The lack of habitat for the Black-backed woodpecker is based upon the average post treatment condition, but habitat would exist on 79 acres of untreated ponderosa pine plant associations that are either in Riparian Habitat Conservation Areas (RHCA) or other leave areas at the 50% tolerance level. Habitat is provided at the 50% tolerance level for the Lewis' woodpecker (LEWO), Mountain bluebird (MOBL), Northern flicker (NOFL), and Western bluebird (WEBL) for total snags larger than 9.85 inches dbh and at the 30% tolerance level for the White-headed woodpecker and Hairy woodpecker (HAWO).

Due to the previous harvest history of the area where the Murray Fire occurred, large trees were scarce; post fire, large snags are now scarce. Alternative 1 would provide habitat at the 30% tolerance level for the Lewis' woodpecker (LEWO) and Mountain bluebird (MOBL) for snags larger than 19.7 inches dbh. The Northern flicker (NOFL) would not have habitat provided at the 30% level on an average across the project area, but habitat would be retained at the 30% level on the 79 untreated ponderosa pine plant association acres. This alternative also meets LRMP standards for primary excavators.

Alternative 3

Direct and Indirect Effects

This alternative proposes to salvage log 157 acres of ponderosa pine plant communities (and 9 acres of miscellaneous plant communities) on the burned area. Sixty-one acres of ponderosa pine community would remain un-harvested. This un-harvested area is scattered throughout the project area in a sufficient distribution to meet LRMP standards for maintaining snag habitat every 40 acres. This would retain 5,063 total snags ≥ 10 inches dbh in the project area of which

244 snags would be ≥ 20 inches dbh. Additional snags to meet home range requirements of the pygmy nuthatch would not be left in this alternative. Calculating snag density for the 209 acres of ponderosa pine plant community, this equates to 24.2 snags per acre, of which 1.2 snags per acre would be ≥ 20 inches dbh for the entire project area, which exceeds LRMP standards. Under this alternative, habitat is provided for all species predicted by DecAID to be using the project area except the Black-backed woodpecker (BBWO). The lack of habitat for the Black-backed woodpecker is based upon the average post treatment condition, but habitat would exist on 61 acres of un-treated ponderosa pine plant associations that are either in Riparian Habitat Conservation Areas (RHCA) or other leave areas at the 50% tolerance level. Habitat is provided at the 50% tolerance level for only one species, the Lewis' woodpecker (LEWO), for total snags larger than 9.85 inches dbh. Habitat is provided at the 30% tolerance lever for the White-headed woodpecker), Mountain bluebird (MOBL), Northern flicker (NOFL), and Western bluebird (WEBL) and Hairy woodpecker (HAWO).

Due to the previous harvest history of the area where Murray Fire occurred, large trees were scarce; post fire, large snags are now scarce. Alternative 3 would provide habitat at the 30% tolerance level for the Lewis' woodpecker (LEWO) and Mountain bluebird (MOBL). The Northern flicker (NOFL) would not have habitat provided at the 30% level on an average across the project area, but habitat would be retained at the 30% level on the 61 untreated ponderosa pine plant association acres. This alternative also meets LRMP standards for primary excavators.

Cumulative Effects

The Middle South Fork John Day River watershed has had a long history of activities that resulted in the removal of snags and logs. Primarily, past timber harvest and firewood cutting have resulted in the watershed having very low snag numbers. These activities have resulted in the present situation shown in the following table. These data were derived through the analysis of Continuous Vegetation Survey (CVS) plot data (see Table 24).

Table 24. Middle South Fork John Day River Watershed Snags and Logs: CVS Plot data

Plot Number	Plant Assoc.	Snags/Ac 2-10"	Snags/Ac 10.1-16"	Snags/Ac 16.1-22"	Snags/Ac >22.1"	Total Snags/ Acre	Logs/Ac <12"	Ave. Length in feet	Logs/Ac >12"	Ave. Length in feet
1096296	CP	23.9	0.0	0.0	0.0	23.9	364.1	17.7	0.0	0.0
1096300	CP	0.0	0.0	0.0	0.0	0.0	601.0	10.1	0.0	0.0
2094294	CP	0.0	0.0	0.0	0.0	0.0	199.5	7.6	0.0	0.0
2094298	CP	0.0	0.0	0.0	0.4	0.4	990.8	6.9	44.6	6.0
2095296	CP	16.0	1.1	1.1	1.2	19.4	705.1	7.4	101.1	24.7
2095300	CD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2096294	CD	4.0	0.0	0.0	1.5	5.5	42.8	21.7	0.0	0.0
2096298	JW	0.0	0.0	0.0	0.0	0.0	133.9	2.0	0.0	0.0
2097296	JW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2097298	JW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Std. DeV		8.5	0.3	0.3	0.6	9.0	351.1	7.5	33.5	7.8
Median		0.0	0.0	0.0	0.0	0.0	166.7	7.2	0.0	0.0

Some of the plots met LRMP requirements for both snags and down wood, but the watershed is deficit in having sufficient dead wood habitat to meet LRMP standards and life requirements for both primary cavity excavators as well as those species relying on down wood. The median value of these plots is no snags and no large logs per acre.

The Murray Fire caused an influx of dead wood habitat into the Middle South Fork John Day watershed. Also the 747 Fire, which occurred in the Black Canyon Wilderness area to the north of this project area, injected additional dead wood habitat. Presently, the amount of dead wood habitat is increasing. The Sunflower Natural Fuels project is also a future planned project. The analysis of this project shows that through the introduction of additional prescribed fire activities on 15,284 acres, the following inputs of dead wood habitat are expected:

Table 25. Expected inputs of dead wood habitat: underburning only - 4943 acres

Snags/Ac	Snags/Ac	Snags/Ac	Snags/Ac	Total Snags/	Logs/Ac	Ave. Length	Logs/Ac	Ave. Length
2-10"	10.1-16"	16.1-22"	>22.1"	Acre	<12"	in feet	>12"	in feet
10+	1+	.5-1	.5-1	13+	50+	2-20	4+	20+

Table 26. Expected Inputs of dead wood habitat: one mechanical pretreatment and underburn - 6593 acres

Snags/Ac	Snags/Ac	Snags/Ac	Snags/Ac	Total Snags/	Logs/Ac	Ave. Length	Logs/Ac	Ave. Length
2-10"	10.1-16"	16.1-22"	>22.1"	Acre	<12"	in feet	>12"	in feet
15+	1-2	1	.5-1	19+	200+	2-20	4+	20+

Table 27. Expected Inputs of dead wood habitat: two mechanical pretreatments and underburn – 3748 ac.

Snags/Ac	Snags/Ac	Snags/Ac	Snags/Ac	Total Snags/	Logs/Ac	Ave. Length	Logs/Ac	Ave. Length
2-10"	10.1-16"	16.1-22"	>22.1"	Acre	<12"	in feet	>12"	in feet
10+	1-2	.5-1	.5-1	14+	50-100	2-20	4+	20+

While dead wood habitat for primary excavators is increasing, the long term out look for these birds based upon DecAID shows that for most birds, we will be at the 30% tolerance level long term with white-headed and black-backed woodpeckers not having reached the 30% tolerance level for habitat in smaller snags (≥ 9.85") and the northern flicker not having reached the 30% tolerance level for large snags (≥ 19.7").

3. Neotropical Migratory Birds

Environmental Effects

Partners In Flight (PIF) is a cooperative effort involving partnerships among federal, state, and local government agencies, philanthropic foundations, professional organizations, conservation groups, industry, the academic community, and private individuals. PIF lead the effort to complete a series of Bird Conservation Plans for the continental United States (Altman, 2000). PIF Landbird Conservation Planning provides the framework to develop and implement landbird conservation strategies by recommending conservation actions that may prevent the need for listings under the Endangered Species Act. These plans included priority setting, establishment of objectives, necessary conservation actions, and evaluation criteria necessary for bird conservation.

The PIF Bird Conservation Plan is being used to address the requirements contained in Executive Order (EO) 13186, January 10, 2001, Responsibilities of Federal Agencies to Protect Migratory Birds. Section 3(E)(6) of that EO states agencies shall ensure that environmental analyses evaluate the effects of proposed actions on migratory birds, with emphasis on species of concern. The PIF plan provides a method for analyzing effects upon neotropical migratory birds through the use of guidelines for priority habitats and bird species by subprovince. The conservation plan does not directly address all landbird species, but instead uses numerous "focal species" as

indicators to describe the conservation objectives and measure project effects in different priority habitats for the bird community found there.

The PIF Bird Conservation Plan defines priority habitats and focal species by subprovince. The Ochoco National Forest is within the Blue Mountains subprovince. Table 28 lists the priority habitats and PIF focal species for the Blue Mountains subprovince.

Table 28. Blue Mountains Subprovince Priority Habitats and Focal Species

Priority Habitats	Focal Species for the Blue Mts. Province
Dry Forest	White-headed woodpecker, flammulated owl, chipping sparrow, Lewis' woodpecker
Mesic Mixed Conifer	Townsend's warbler, Vaux's swift, varied thrush, MacGillivary's warbler, olive-sided flycatcher
Riparian Woodland	Lewis' woodpecker, red-eyed vireo, veery
Riparian Shrub	Willow flycatcher
Subalpine Forest	Hermit thrush
Montane Meadows	Upland sandpiper
Steppe Shrublands	Vesper sparrow
Aspen	Red-naped sapsucker
Alpine	Gray-crowned rosy finch

Effects to the Lewis' and white-headed woodpecker were previously discussed under the Management Indicator Species, primary cavity excavator section.

The upland sandpiper is a Region 6 Regional Forester's Sensitive Species and its habitat is not affected by the project proposals because there is no habitat in the project area. The Vesper sparrow inhabits steppe shrublands found at lower elevations. The gray-crowned rosy finch inhabits alpine habitats. The red-eyed vireo, veery, and willow flycatcher are associated with riparian woodland and shrub plant communities. The red-naped sapsucker is a bird that uses aspen-dominated vegetation. None of the above mentioned habitats occur within this project area. Therefore, the proposed activities would have no effect to these species or their habitats.

Of species using coniferous forests, the Townsend's warbler, Vaux's swift, varied thrush, MacGillivary's warbler, and olive-sided flycatcher use mixed mesic conifer forests. Hermit thrushes use high elevation sub alpine forests. The project area contains only dry forest types and thus the proposed activities would also not affect these species.

The remaining species, the flammulated owl and chipping sparrow, use habitats defined as dry forest. Following are the effects analyses for these species.

Alternative 1 – No Action

Direct and Indirect Effects

The No Action alternative would not have short-term effects on either flammulated owls or chipping sparrows. This alternative proposes no action in the form of salvage logging or any restoration activities such as hydrologic stabilization or reforestation. In its present condition, the dry forest types (ponderosa pine plant associations) are not habitat for either bird because of the intense fire event. Long term, the No Action alternative would take longer to reach habitat

suitable for the flammulated owl and chipping sparrow because reforestation activities would not occur.

Alternative 2 – Proposed Action and Alternative 3

Direct and Indirect Effects

The Action alternatives would have no short-term effect on habitats used by flammulated owls and chipping sparrows. Because the Murray Fire eliminated the area's suitability for use by these birds, the proposed activities would not remove any additional habitat. Long term, these alternatives would probably have a slightly more beneficial effect than the no action alternative because the planned reforestation activities would accelerate the growth of the site into conditions that would provide habitat for these birds.

Cumulative Effects

Cumulative effects within the planning area, which result from the incremental impact of the alternatives and added to other past, present and reasonably foreseeable future actions regardless of whom undertakes the action will be described. There has been a long history of timber harvest and fire suppression within the planning area and on the Paulina Ranger District. These activities have resulted in the existing forested conditions for these focal species. Prior to implementing the VEMG, management activities did not always design treatments to move stands toward HRV. Although, this past activity has occurred it has not greatly affected these focal species, because their populations are stable or increasing within the state, and through time their habitat increases across all alternatives. Implementing VEMG and targeting stands to move vegetation towards HRV will ultimately provide for the habitat needs of these species within the planning area.

The action of salvage logging the Murray Fire area does not add to the cumulative effects of management actions in the Planning area, except for primary cavity excavators. Cumulative effects for these wildlife species are detailed in the sections pertaining to these species.

4. Northern Goshawk

Environmental Effects

The goshawk is a forest habitat generalist that uses a variety of forest types, forest ages, structural conditions, and successional stages for all portions of its life history. It preys on small to medium sized birds and mammals, which it captures on the ground, in trees, or in the air (Reynolds et al., 1992). There are five known goshawk territories with designated Post Fledging Areas (PFA) within the Middle South Fork John Day River, none of which occur in the project area.

Management objectives for the PFA are to:

- Provide hiding cover for fledglings
- Provide habitat for prey and foraging opportunities for adults and fledglings
- Desired Conditions for the PFA are to provide:
- Sixty percent of the stand structure in the VEMG structure size 4 and 5 categories (9-20.9" and > 21" dbh) with the majority in the 5 class (LOS)
- The remaining 40 percent, with 20 percent in VEMG structure size 3 (5-8.9" dbh), 10 percent in VEMG structure size 2 (< 5" dbh), and 10 percent in VEMG structure size 1 (grasses, forbs and shrubs)

LOS habitat conditions would include: snags, downed logs, mature and old, live trees in clumps or stringers with interlocking crowns, and a developed herbaceous and shrub understory that would be present with an emphasis on native grasses

Alternative 1 – No Action

Direct and Indirect Effects

No harvest would occur within currently identified PFA. Nesting habitat suitability within the project area has been eliminated by the Murray Fire and will be unsuitable for nesting for at least 100 years into the future. As the area re-forests over the long term, this area may again become usable by this bird.

Alternative 2 – Proposed Action and Alternative 3

Direct and Indirect Effects

The Action alternatives would have no short-term effects to potential nesting sites within the project boundary. No live trees would be harvested and no LOS would be affected. The Murray Fire eliminated the suitability of nesting habitat within the project area. Removal of dead trees may have a slight negative affect to the potential long-term suitability of this habitat. Some of the prey species of the goshawk are dead wood habitat users and removal of this material may influence prey abundance in the long term. A connected action of reforestation activities with the action alternatives would be beneficial to this bird by accelerating the rate of the stand re-growing into structural characteristics suitable for goshawk reproduction activities.

Cumulative Effects

Much of the Middle South Fork John Day River watershed has had logging activities during the past. The combination of these activities has reduced the amount of reproductive habitat in the watershed so that presently there are 3,392 acres less habitat than existed under natural disturbance regimes. The area in which the Murray Fire occurred was an area with previous timber harvest activities and was not suitable as habitat before the fire. This area was within 50 years of accumulating the green tree structure, which would have made it suitable. The naturally occurring fire set the time frame back so it will be at least 100 years before the area will become suitable. Proposals for salvage harvest of the dead trees would not hinder and accelerate the time frame necessary for this structural development to take place.

5. Big Game Habitat

Environmental Effects

Environmental effects on big game habitat are measured through the Habitat Effectiveness Index (HEI) standard contained in the Ochoco National Forest Land and Resource Management Plan (LRMP). Quantity and quality of cover, and open road density are the main factors influencing the Habitat Effectiveness Index (HEI). Rocky Mountain Elk and Mule deer use the Middle South Fork John Day River 5th field watershed year round. HEI is a tool used to assess the existing condition of big game habitat. The following analysis was conducted in accordance with the Ochoco National Forest Plan HEI process calculation. Currently, the HEI condition, factoring the removal of cover from the Murray Fire, is above LRMP standards. The Murray Fire removed

cover values on 209 timbered acres (ponderosa pine plant associations) of the 321 burned acres. The table below shows existing big game habitat conditions in the watershed:

Table 29. Habitat Effectiveness Index Summary

S.F. John Day	Decade 2 HEI	Decade 3 HEI	Decade 4 HEI	Existing HEI	Cover Acres	Open Rd Density
General Forest	7%	7%	7%	44%	12,377	2.18
Winter Range	4%	8%	8%	6%	66	1.48

Alternative 1 – No Action

Direct and Indirect Effects

Thermal and hiding cover will be virtually non-existent within the burned area. Dead trees will still provide minimal amounts of thermal and hiding cover until the majority of dead trees have fallen. Within the first decade post fire, the majority of dead trees are expected to fall. Hiding cover which may be more critical within the fire area would also decrease as dead trees fall, reaching a maximum effect by about year 10. Regeneration of trees would occur slowly from the fire perimeters toward their centers, reducing sight distance as they attain 5-10 feet in height in 15-30 years. Regeneration of trees to provide thermal cover, which is defined as 40 feet tall and providing 40% crown closure, is expected to take in excess of 70 years.

Although not included in calculation of HEI, forage values to big game are expected to increase both in the short and long term. Removal of forest canopies through wild or prescribed fire stimulates forest floor vegetation and provides nutrient rich forage to ungulates. Forage values are expected to remain improved until crowns of regenerating conifers start reaching 40 % percent closure in 70 years.

Alternative 2 – Proposed Action and Alternative 3

Direct and Indirect Effects

Because the Murray Fire removed cover from the project area and no net change in road density is proposed, the HEI values for the action alternatives would remain the same as the no action alternative. Effects described for the no action alternative, i.e. reduction of cover and increased forage value, are anticipated for the action alternatives. Cover may be regained in a quicker timeframe because of reforestation activities. Also, 1.3 miles of inactivated local roads would receive additional hydrologic treatment to increase filtration and reduce sedimentation. The effect of this work would be to more securely exclude motorized vehicles and provide additional security for big game animals. Additionally, because these roadbeds are proposed for seeding, forage values to big game may be slightly more enhanced than from the action alternative. Use of roads adjacent to the project area would be increased due to log hauling activities. Because the 5800 Road is parallel to the burned area, and because this road is an arterial road which receives heavy traffic, the anticipated two to five additional log trucks daily for seven to ten days is not a factor that would effect big game distribution around the project area.

Cumulative Effects

Historically, elk were rare to uncommon in the Ochoco Mountains. It has only been in the last two decades that elk populations have notably increased. Deer populations have remained

relatively constant over the past 20 years. Grazing, timber harvest, and road construction have cumulatively affected deer and elk. However, hunting has and will continue to be the primary limiting factor affecting big game populations. Cumulatively, there have been consistent changes in management benefiting big game. These include, but are not limited to, actively reducing open road densities, increased prescribed burning which improves forage quantity and quality, recent changes in the management of livestock to help protect riparian areas, wildlife improvement projects, and the Rager Green Dot road closure during hunting seasons.

6. LOS Connectivity

Environmental Effects

Connections have been not been identified between designated old growth and all VEMG size class 5s (LOS), greater than 5 acres in size for the Middle South Fork John Day River watershed. Connectivity corridors require relatively high crown closure (within the upper 1/3 of site capability) and are to be at least 400 feet wide. Connectivity to designated old growth stands provides for travel routes of species, such as the pileated woodpecker, that are old growth related and prefer higher canopy closures. Higher canopy closures provide hiding cover for pileated woodpeckers from predators such as goshawks and great horned owls.

Alternative 1 – No Action

Direct and Indirect Effects

This alternative would not effect the existing situation of virtually no live trees within the project area. Under this alternative, the area burned in the Murray Fire would not function as a corridor between LOS tree stands. At least 60 years will be required before the project area could begin to function as connectivity between existing LOS stands.

Alternative 2 – Proposed Action and Alternative 3

Direct and Indirect Effects

The action alternatives would have no affect on the suitability of the project area for providing connectivity between LOS stands in the watershed. The Murray Fire removed the project area from being capable of providing this connectivity. Because the definition of connectivity corridors are live tree stands with relatively high crown closure, this area does not meet the requirement either in its condition now or if some of the dead trees are removed through salvage activities.

Cumulative Effects

Much of the Middle South Fork John Day River watershed has had logging activities during the past that has affected connectivity of habitats with old growth characteristics. Past logging activities have thinned tree canopies or removed larger trees reducing the amount of connectivity. The area in which the Murray Fire occurred was an area with previous timber harvest activities and was not suitable as connectivity habitat before the fire. This area was within 25 years of accumulating the green tree structure, which would have made it suitable. The naturally occurring fire set the time frame back so that it will be at least 75 years before the area will become suitable. Proposals for salvage harvest of the dead trees would not hinder and accelerate the time frame necessary for this structural development to take place.

7. Snags and Down Logs

Environmental Effects

The Ochoco Land and Resource Management Plan standards and guidelines for snags specify that across the Forest, snags must meet an average of 47% of biological potential. The Regional Forester's Forest Plan Amendment # 2 (USDA Forest Service, ONF, 1997) amended the Ochoco LRMP. The Regional Forester's Forest Plan Amendment # 2 requires managing snags at 100% maximum potential for primary cavity excavators, which is a minimum of 2.25 snags/acre (Thomas J.W., 1979). Viable Ecosystem Management Guide (VEMG) levels for snags were agreed upon with the Regional Office to meet the amendment standards and guidelines, except that snags would not be managed below a minimum of 2.25 snags/acre (USDA Forest Service, 1997). The following table shows the snag by plant association group described in VEMG.

Table 30. Snag Levels from VEMG

Plant Association	Snag Range
Moist Grand Fir	5-12/acre <20"dbh and >12" dbh 2-6/acre >20"dbh
Dry Grand Fir	2-6/acre <20" dbh and >12" dbh .2-2/acre >20" dbh
Douglas Fir	2-4/acre <20" dbh and >12" dbh .2-2/acre >20" dbh
Xeric Ponderosa Pine	1-2 <20" dbh and >12" dbh .1-1/acre >20" dbh
Mesic Ponderosa Pine	2-4/acre <20"dbh and >12" dbh .2-2/acre >20" dbh

Since the project area is entirely in the mesic and xeric ponderosa pine plant associations, the LRMP stand is 2.25 snags per acre of which 1 per 10 acres must be greater than 21 inches dbh.

Log levels are prescribed in the Regional Forester's Forest Plan Amendment # 2 and are presented in the following table.

Table 31. Regional Forester's Forest Plan Amendment # 2 Log Levels

Species	Pieces Per Acre	Diameter Small End	Piece Length and Total Lineal Length
Ponderosa Pine	3-6	12"	> 6 ft. 20-40 ft.
Mixed Conifer	15-20	12"	>6 ft. 100-140 ft.

Alternative 1 – No Action

Direct and Indirect Effects

The No Action alternative would retain all snags in juniper woodland communities and approximately 43 snags per acre ≥ 12 inches dbh or 8,987 total snags on ponderosa pine plant communities. Of these snags, approximately 4 per acre are ≥ 20 inches dbh or 836 total large snags. These estimates were derived using stand exam data taken on site within the project area. During the Murray Fire event, the intensity of the burn consumed virtually all of the logs on the ground, prior to the fire, and the project area currently does not meet LRMP standards for log numbers. It is expected that many of the fire-killed trees will fall in the first decade post fire and the LRMP standard will be met for logs fairly quickly (less than 10 years).

Alternative 2 – Proposed Action

Direct and Indirect Effects

This alternative proposes to salvage log 139 acres of ponderosa pine plant communities (and nine acres of miscellaneous plant communities) on the burned area. Seventy-nine acres of ponderosa pine community would remain un-harvested. This un-harvested area is scattered throughout the project area in a sufficient distribution to meet LRMP standards for maintaining snag habitat every 40 acres. This would retain 3,397 total snags ≥ 12 inches dbh in the project area of which 316 snags would be ≥ 20 inches dbh. Additionally, because of the size of unit 3 and the desire to maintain habitat for the smallest home range primary cavity excavator (pygmy nuthatch, 10 acre home range), an additional 20% of LRMP standard for the harvested area would be left as islands of snags in unit 3. An additional 62 snags ≥ 12 inches, of which 3 would be ≥ 20 inches, would be left in unit 3 to provide habitat in the large unit. In calculating snag density for the 209 acres of ponderosa pine plant community, this equates to 16.5 snags per acre, of which 1.5 snags per acre would be greater than 20 inches dbh for the entire project area, which exceeds LRMP standards.

Logs would remain below LRMP standards in the short term, but is expected to meet standards within a decade.

Alternative 3

Direct and Indirect Effects

This alternative proposes to salvage log 157 acres of ponderosa pine plant communities (and 9 acres of miscellaneous plant communities) in the burned area. Sixty-one acres of ponderosa pine community would remain un-harvested. This un-harvested area is scattered throughout the project area in a sufficient distribution to meet LRMP standards for maintaining snag habitat every 40 acres. This would retain 2,623 total snags ≥ 12 inches in the project area of which 244 snags would be ≥ 20 inches dbh. Additional snags to meet home range requirements of the pygmy nuthatch would not be left in this alternative. In calculating snag density for the 209 acres of ponderosa pine plant community, the retention rate for alternative 3 equates to 12.5 snags per acre, of which 1.2 snags per acre would be ≥ 20 inches dbh for the entire project area which exceeds LRMP standards.

Logs would remain below LRMP standards in the short term but is expected to meet standards within a decade.

Cumulative Effects

The Middle South Fork John Day River watershed has had a long history of activities that resulted in the removal of snags and logs. Primarily, past timber harvest and firewood cutting have resulted in the watershed having very low snag numbers. These activities have resulted in the present situation shown in the following table. These data were derived through the analysis of Continuous Vegetation Survey (CVS) plot data (see Table 32)

Table 32. Middle South Fork John Day River Watershed Snags and Logs: CVS Plot data

Plot	Plant	Snags/Ac	Snags/Ac	Snags/Ac	Snags/Ac	Total Snags/	Logs/Ac	Ave. Length	Logs/Ac	Ave. Length
Number	Assoc.	2-10"	10.1-16"	16.1-22"	>22.1"	Acre	<12"	in feet	>12"	in feet
1096296	CP	23.9	0.0	0.0	0.0	23.9	364.1	17.7	0.0	0.0
1096300	CP	0.0	0.0	0.0	0.0	0.0	601.0	10.1	0.0	0.0
2094294	CP	0.0	0.0	0.0	0.0	0.0	199.5	7.6	0.0	0.0
2094298	CP	0.0	0.0	0.0	0.4	0.4	990.8	6.9	44.6	6.0
2095296	CP	16.0	1.1	1.1	1.2	19.4	705.1	7.4	101.1	24.7
2095300	CD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2096294	CD	4.0	0.0	0.0	1.5	5.5	42.8	21.7	0.0	0.0
2096298	JW	0.0	0.0	0.0	0.0	0.0	133.9	2.0	0.0	0.0
2097296	JW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2097298	JW	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Std. DeV		8.5	0.3	0.3	0.6	9.0	351.1	7.5	33.5	7.8
Median		0.0	0.0	0.0	0.0	0.0	166.7	7.2	0.0	0.0

Some areas meet LRMP requirements for both snags and down wood, but the situation is that most of the watershed is deficit in having sufficient dead wood habitat to meet LRMP standards and life requirements for both primary and secondary cavity nesters as well as those species relying on down wood. The median value of these plots is no snags and no large logs per acre. The Murray Fire caused an influx of dead wood habitat into this area of the Paulina Ranger District. Also, the 747 Fire, which occurred in the Black Canyon Wilderness area several air miles to the north of this project area, injected several thousand acres of additional dead wood habitat. Presently, the amount of dead wood habitat is increasing. The Sunflower Natural Fuels project is also a future planned project. The analysis of this project shows that through the introduction of additional prescribed fire activities on 15,284 acres, the following inputs of dead wood habitat are expected:

Table 33. Expected Inputs of Dead Wood Habitat: Underburning Only- 4943 acres

Snags/Ac	Snags/Ac	Snags/Ac	Snags/Ac	Total Snags/	Logs/Ac	Ave. Length	Logs/Ac	Ave. Length
2-10"	10.1-16"	16.1-22"	>22.1"	Acre	<12"	in feet	>12"	in feet
10+	1+	.5-1	.5-1	13+	50+	2-20	4+	20+

Table 34. Expected Inputs of dead wood habitat: one mechanical pretreatment and underburn -6593 acres

Snags/Ac	Snags/Ac	Snags/Ac	Snags/Ac	Total Snags/	Logs/Ac	Ave. Length	Logs/Ac	Ave. Length
2-10"	10.1-16"	16.1-22"	>22.1"	Acre	<12"	in feet	>12"	in feet
15+	1-2	1	.5-1	19+	200+	2-20	4+	20+

Table 35. Expected Inputs of dead wood habitat: two mechanical pretreatments and underburn - 3748 acres

Snags/Ac	Snags/Ac	Snags/Ac	Snags/Ac	Total Snags/	Logs/Ac	Ave. Length	Logs/Ac	Ave. Length
2-10"	10.1-16"	16.1-22"	>22.1"	Acre	<12"	in feet	>12"	in feet
10+	1-2	.5-1	.5-1	14+	50-100	2-20	4+	20+

Direct and Indirect Effects

Given that the proposed salvage is addressing trees that are fire-killed and that it is a matter of time before they fall and become part of the fuels profile and available for reburning, the alternative that removes the most trees does the best job of reducing the spread and intensity of wildfires of the future on the site. Again, the potential for reburn was considered and does exist, but given the intensity of the Murray Fire and the resultant lack of fuel in all size classes, reburn was not considered a critical issue.

Fuels

Existing Condition

Historically, the Murray Fire Salvage project area was entirely within the non-lethal/very frequent (less than 25 years) fire regime. Results from non-lethal fires are greater than 70 % of the basal area or more than 90% of the canopy cover remaining after the fire. Conditions on-site changed over time, (stand stocking levels, fuel loading, vertical continuity, etc.,) moving the area to a mixed/infrequent (76-150 years) fire regime. Fires of intermediate or mixed effects often result in a mosaic of varying intensities. These site conditions and the extreme fire weather on the day of the fire (July 23, 2002) conspired together for a lethal, stand replacing fire well outside the historic range of variability for the site.

The Murray Fire Salvage project area is broken by scablands and natural openings that are not prone to burn under nearly any condition. The day the Murray Fire burned to 321 acres was extreme with regards to midflame winds and low humidities. It would have burned thousands of acres had the landscape been continuous rather than broken by natural features and roads.

Today, expected fire behavior for the Murray Fire area is very close to non-existent but will increase slowly over the next several years. Numerous studies have documented fall rates in percent per year for dead trees by species and size. When trees fall they become part of the fuels profile, and while this site will see unnaturally high levels of dead, down material considering it's fire regime, the increased loading will affect fire intensities rather than fire spread. As heavy fuels (large diameter) begin to decay, they become receptors for spot fires. As fires increase in intensity in heavy fuels, they can give rise to short-range spotting, thus the spread of fires in heavy fuels can be of a pulsing manner.

It is expected that the project area will experience a strong response in grass cover. Grass typically cures in July in this part of the Forest and will become the fuel that increases spread rates on the site. The resulting fuel profile, grass cover and large size material will put patches of regeneration at risk, but not to the extent that existed prior to the Murray Fire.

Environmental Effects

Alternative 1 – No Action

Fuels: This alternative would not treat existing fuels and would not create activity fuels. The natural fuels would continue to accumulate, and as the trees fall, the size and intensity of most fires would increase. Fires burning in fuels composed primarily of larger tree size classes exhibit high intensities but slow spread rates. The spread of fire in these fuel complexes is mainly due to spotting as large fuels in various stages of decay make excellent receptors for firebrands. The highest suppression costs, the largest risk to reproduction, and moderate impacts to soils can be expected in future fires. Based on expected fuel loading, historical fires, and weather, greater than 95% of fires would be caught at initial attack and less than 5 % would exceed 10 acres.

Air Quality: This alternative would not treat fuels, so Air Quality would not be directly affected.

Alternative 2 – Proposed Action

This alternative would treat a total of 139 acres in three units. The removal of trees would be by a feller-buncher. Even with the use of this harvesting equipment, some breakage is expected to occur. The material relocated to the landing is expected to be approximately 15 tons per landing. Seven landings would be used.

Fuels: While fuels are reduced in this alternative, only portions of the potential fuels are targeted. The figures for success of initial attack of suppression forces change little. The most noticeable benefit would be seedling survival and reduced soil impacts following subsequent wildfires.

Air Quality: Landing pile burning would produce the majority of emissions in the planning area. This alternative would produce less than one ton of total suspended particulates (TSP). Burning of piles tends to be during inclement weather and during periods of low visitor use with the possible exception of the Rocky Mountain Elk hunting seasons in November.

By following Forest-wide and Management Area Standards and Guidelines, no adverse effects from treatment of fuels are expected.

Alternative 3

This alternative would treat a total of 157 acres in four units. The removal of trees would be by a feller-buncher. Even with the use of this harvesting equipment, some breakage is expected to occur. The material that is relocated to the landing is expected to be approximately 15 tons per landing. Eight landings would be used.

Fuels: While fuels are reduced in this alternative, only portions of the potential fuels are targeted. The figures for success of initial attack of suppression forces change little. The most noticeable benefit would be seedling survival and reduced soil impacts following subsequent wildfires. Alternative 3 treats the most acres and thus protects the most acres in terms of on-site effects.

Air Quality: Landing pile burning would produce the majority of emissions in the planning area. This alternative would produce less than one ton of total suspended particulates (TSP). Burning of piles tends to be during inclement weather and during periods of low visitor use with the possible exception of the Rocky Mountain Elk hunting seasons in November.

Cumulative Effects

Fuels: Additional fuels reduction activities are expected to occur within this subwatershed under the Sunflower Natural Fuels Environmental Analysis. The long term desired future condition is to break up fuel continuity, reduce canopy densities, and ladder fuels over the landscape. Approximately 15,000 acres of additional fuel reduction activities have been proposed at this time. Additional analysis is currently ongoing.

Air Quality: By following Forest-wide and Management Area Standards and Guidelines, no adverse cumulative effects from treatment of fuels are expected because the amounts of smoke particles are limited.

Fisheries

The Murray Fire occurred within the Sunflower Subwatershed (6th field; Hydrologic Unit Code 170702011223) in the summer of 2002. The Murray Fire burned through four intermittent flowing (class IV) tributaries to Murray Creek. Murray Creek lies within the Sunflower Subwatershed and is approximately 1.7 river miles in length. The Sunflower Subwatershed drains the eastern slope of the Ochoco Mountains and is located within the larger John Day River Basin. The Sunflower Subwatershed drains 19,167 acres and is located in the Middle South Fork John Day River Watershed (5th field; Hydrologic Unit Code 1707020112). Sunflower Creek empties into the South Fork John Day River at river mile 23.9. Streams that occur within the Sunflower Subwatershed include: Sunflower Creek, Murray Creek, Wildcat Creek, Porcupine Creek, Cougar Creek, and Columbus Creek.

Stream flows that originate from the Sunflower Subwatershed are characteristic of a snowmelt hydrograph. A larger portion of the base flows are comprised of ground water recharge influenced from water table interaction (i.e. springs and seeps). Variations in discharge regime can also result from rainfall. Average annual precipitation ranges from 17 – 19 inches, however, precipitation amounts have been very low (less than 10 inches) during the last five years.

Fish Populations

Existing Conditions

The South Fork John Day River supports native runs of summer Mid-Columbia River steelhead trout (*Oncorhynchus mykiss spp.*), as well as Interior redband trout (*Oncorhynchus mykiss gairdneri*). Mid-Columbia River steelhead trout were Federally listed threatened by the National Marine Fisheries Service on May 24, 1999. The John Day River Basin has no supplemental stocking of hatchery steelhead trout (USDA Forest Service, 2001). The upper limit of distribution for steelhead trout within the South Fork John Day River is assumed to be at Izee Falls (0.98 river miles below the confluence of Sunflower Creek). This natural, large boulder, cascade type falls is considered a fish passage barrier. Current assessment information does not indicate either way that summer run steelhead may be able to negotiate the barrier under the most ideal stream flow conditions.

The Magnuson-Stevens Act (amended by the Sustainable Fisheries Act of 1996) implements direct action to stop or reverse the continued loss of fish habitats and identifies essential habitat for chinook salmon (*Oncorhynchus tshawytsha*) in the John Day River Basin. The John Day

River Basin supports one the few remaining wild runs of spring chinook salmon and provides 117 miles of habitat (Lindsay et al., 1986). Chinook salmon are main stem tributary spawners and have not been documented utilizing habitat on the Ochoco National Forest during the adult or juvenile life stages. Utilization of available habitat in the South Fork John Day River for spawning and rearing by spring chinook salmon usually occurs on an alternate year (or more) basis.

The densities of individuals that have been documented utilizing the river occur at low numbers (Unterwegner, 2003). However, presence is low within the river and seems to occur on an alternate year basis (or more) (Unterwegner, 2003). Chinook salmon utilization within the South Fork occurs in the lower third of the river (mouth to confluence of Murderers Creek).

Interior redband trout is included on the Regional Forester's sensitive species list and is an Ochoco National Forest (USDA, 1989) management indicator species. Redband trout habitat includes freshwater streams, rivers, and lakes. Redband trout occupy and are widely distributed across the Ochoco National Forest stream network including Sunflower Creek and the majority of its perennial flowing tributaries. Stream habitats for redband trout are characterized by clear, cool water with relatively stable flows. Streams with healthy redband trout populations show an abundance of instream cover, well-vegetated stable stream banks, relatively stable temperature regimes, and abundant macro-invertebrates. Streams with the highest redband trout densities include: Sunflower Creek (lower half), Wildcat Creek, and Cougar Creek (lower third).

The Malheur mottled sculpin (*Cottus bairdi*) has been documented on the Malheur National Forest and resides on the Regional Forester's sensitive species list. Sculpin prefer, clear, cool, water in streams with moderate to rapid currents and summer temperatures of 55˚ – 65˚ F. Past sampling efforts indicate presence within Harney Basin tributaries (Wickiup, Sawmill, Silver, Rough, Nicoll, and Dairy Creeks). In addition, this variation of sculpin is known to occur in Smyth, Riddell, Poison, and Devine Creeks, and in parts of the Silvies and Blitzen Rivers (Grover, 1990). This variety of sculpin has not been sampled for outside of the Harney Basin. Sculpin have not been sampled for within Sunflower Creek.

Brook trout (*Salvenlinus fontinalis*) resides as a management indicator species in the Ochoco National Forest Plan. Brook trout are non-native species introduced by the Oregon Department of Fish and Wildlife and now reside within limited streams, competing for food and available habitat and, in segments in the Upper North Fork Crooked River, have been known to predate on other trout. Brook trout do not occur within Sunflower Creek and are not found in tributaries within the South Fork John Day River Basin.

Fish Habitat

Existing Conditions

The Murray Project area has four Class 4 channels that generally are dry early in the summer and do not contribute to stream flow in Murray Creek during the summer when stream temperatures become a concern. Due to the nature of these channels and length of flow, no fish habitat exists within the planning area. Additional information on existing conditions of fish habitat outside the project area can be found in the full Fisheries report and is available upon request at the Paulina Ranger District.

Environmental Consequences

The environmental consequences to fish habitat evaluates both land and stream attributes. Land and stream attributes of watershed health reflect the physical processes, which are affected by climate, physiography, and management, as well as the values at risk in the watershed. Their range of natural variability indicates good watershed health and enables deviations from this range to be discerned. Land indicators of watershed health include vegetation, ground cover and compacted surfaces. Stream indicators of watershed health include channel stability, sediment load and stream structure.

Measures Used for Evaluation of Alternatives

Sedimentation was used as a measure to determine the relative direct effects of salvage logging on water quality and fisheries habitat as well as the soils resource. Potential sediment yields have been analyzed for the project area and the Alternatives (see Soils section, Soil Productivity Measure #2). Effects of sedimentation to water quality have also been discussed previously under Hydrology and Water Quality (see Water Quality Measure #1).

Stream shade was considered as a measure to display indirect effects of the alternatives on stream temperature in relation to water quality and fisheries habitat. Stream temperature will respond with changes in channel morphology and/or vegetation. Stream shade generally functions within 100 - 200 feet of the channel (Beschta, et al., 1987). Increases in water temperature have been shown to not only be lethal to salmonids, but can retard growth in juveniles.

Equivalent Harvest Area (EHA) was used to determine the relative cumulative effects of timber harvest activities and forest vegetative conditions within the watershed. The EHA model evaluates the risk of detrimental impacts to the hydrologic character and water quality. The Land and Resource Management Plan assigned an EHA threshold of 25 percent and is the point at which risk becomes high for this subwatershed (Anderson, 1989).

The 747 Fire was not considered in the fisheries report direct/indirect (sedimentation and shade) and cumulative (EHA) effects discussions for the following reasons: Proposed commercial salvage harvest activities and their connected actions would occur entirely within the Sunflower Subwatershed. This project would occur over 6 river miles away from Izee Falls. Effects from the Murray salvage sale activities on steelhead trout (as well as redband trout) residing below the falls are not measurable and not expected to have any lasting affects to population viability. Currently, Izee Falls on the South Fork John Day River is considered a natural fish barrier and, therefore is the upper limit of steelhead trout distribution within the basin. This project would occur over 6 river miles away from Izee Falls. Effects from the Murray salvage sale activities on steelhead trout (as well as redband trout) residing below the falls are not measurable and not expected to have any lasting affects to population viability.

Sedimentation

Alternative 1 - No Action

Direct and Indirect Effects

Under this alternative, existing land management practices would largely remain the same. It proposes no commercial timber harvest within the Murray Fire Salvage Area. Most Burned Area Emergency Rehabilitation (BAER) activities have been completed and a livestock rest period of one year will be implemented in the pasture where the fire occurred.

Sedimentation: Stream turbidity/sedimentation is expected to increase as a result of the moderate to high fire intensity occurring within the affected drainage. A proportion of this increase in

sediment will occur from the adjacent uplands during periods of overland flow (snowmelt). This proportion is expected to be low due to the construction of log erosion barriers (LEB) during BAER activities. This level of sedimentation will decrease over the first few years after the fire as upland grass communities develop. A higher amount of short-term potential sediment delivery is expected to come from drainage areas (channels and adjacent floodplains) that were directly impacted by the fire. The potential for mobilization of fine sediment is greatest during the first runoff event after the fire has occurred.

Monitoring from the log erosion barriers placed on slopes within the fire area during the BAER activities indicate the structures were effective in capturing fine sediment during overland runoff events. A small percentage of monitored log erosion barriers (2%) were seen to have functioned initially until water-saturated soil broke the seal. In these cases the down slope log erosion barriers were effective at stopping the overland flow (see Hydrology and Water Quality section, Measure #1 – Sedimentation). The closest perennial stream to the Murray Fire area is .5 to 1 mile away. This small increase in sediment is therefore not expected to affect already limited spawning gravel availability for redband trout in lower Murray Creek and Sunflower Creek. In addition, sedimentation is expected to decrease as grass communities (along floodplains and adjacent stream banks) continue to develop. Redband trout populations in Sunflower Creek would be more influenced by sedimentation processes resulting from private land practices.

Alternative 2 – Proposed Action

Three units totaling 139 acres would be commercially harvested in this alternative. All harvest would utilize ground-based machinery. No new road building would occur, and existing skid trails would be utilized. No harvest would occur in the three designated RHCA (class IV streams). Sunflower Creek does not support spawning and rearing life stages for anadromous fisheries, therefore, standards for RHCA buffers would be 50 feet for class IV's in this subwatershed. The Hydrology Effects Report displays methodologies that would be used to salvage log all three units.

Sedimentation: Areas of soil compaction would serve as sources for increased intensities of overland flow due to loss of infiltration. Areas of soil displacement would serve as sources for fine sediment mobilization (both from fire suppression and timber harvest actions). It is expected that some short-term (2-3 years) sedimentation (sediment delivery to the three localized channels) would occur as a result of both the wildfire and timber sale activities. Sedimentation effects would occur indirectly as a result of overland flow due to compaction/displacement, coupled with less interception and evapotranspiration. There is no expected net increase in compaction and displacement for the planning area under this alternative (see Soils Report), as existing skid trails and roads would be utilized and, where over the regional standards, would be rehabilitated (i.e. decompacted). The persistence (amount and duration) of any sedimentation effects to water quality and downstream fisheries habitat would depend on when these soil rehabilitation efforts occur (i.e. one or more flow cycles after harvest activities) and post-fire livestock grazing regimes. The persistence of sedimentation would also vary based on log erosion barriers available to capture soil volume and vegetative recovery.

Mitigations have been incorporated into this project to discourage potential sedimentation effects. All mitigations either directly or indirectly address sedimentation concerns. In addition, log erosion barriers have been established through BAER activities to mitigate most of the sediment concerns (delivery potential and magnitude) due to overland flow.

Alternative 3

Four units, totaling 157 acres (18 more acres than in Alternative 2) would be commercially harvested in this alternative. All harvest would utilize ground-based machinery. No new road

building would occur, and existing skid trails would be utilized. Harvest would not occur in the three designated RHCA (class IV streams). Sunflower Creek does not support spawning and rearing life stages for anadromous fisheries, therefore, RHCA buffers for class IV streams were designated at 50 feet. The Hydrology Effects Report displays methodologies that would be used to salvage log all four units in Alternative 3.

Sedimentation: The short-term potential for sedimentation is higher in Alternative 3 due the addition of another 12 acres in unit 4. Existing skid trails and roads would be utilized and, where over the regional standards, would be rehabilitated (i.e. decompacted). The persistence (amount and duration) of any sedimentation effects to water quality and downstream fisheries habitat would depend on when these soil rehabilitation efforts occur (i.e. one or more flow cycles after harvest activities) and post-fire livestock grazing regimes. The persistence of sedimentation would also vary based on log erosion barriers available to capture volume and vegetative recovery as a result of the fire.

Summary of Direct and Indirect Effects

For the short-term (2-3 years) while vegetation is recovering, Alternative 1 would have the least potential for hydrologic effects from sedimentation and adjustments in channel form due to increases in overland flow. Both Alternatives 2 and 3 would not harvest within identified RHCA areas. These areas are located outside of harvest units. Therefore, in reference to the Beschta Report, this available dead standing wood would be available to local stream channel recruitment. Alternative 2 would have more potential for sedimentation and increased overland flow in the short-term than Alterative 1 due to the incorporation of timber harvest activities, however, with the established design elements, there are no expected measurable differences between these alternatives. Alternative 3 would have the highest potential for short-term hydrologic effects from sedimentation and overland flow. Under Alternative 3, the potential for effects has increased due to more area in skid trails, timber harvest, and logging activities closely adjacent to a headwater area. However, with the established design elements, there are no expected measurable differences between Alternative 3 and the other alternatives.

Stream Shade

Common to All Alternatives

Direct and Indirect Effects

Stream shade: The Murray Fire did not burn through or affect any perennial flowing fish bearing tributaries. The current stream temperature regimes in Murray Creek and Sunflower Creek are not expected to change. Current livestock management, both on Forest and on adjacent private lands, would be the limiting factor of stream temperature/riparian vegetation recovery occurring in Murray Creek and Sunflower Creek.

EHA/Cumulative Effects

Past timber harvest and livestock grazing activities have occurred in Sunflower Subwatershed. These activities have had effects on sediment production, stream shade, and peak flow timing and duration. Other past activities within the subwatershed includes: precommercial thinning, small wildfires, road closures, riparian planting, spring protection and development, and one culvert replacement project.

Present activities within the Sunflower Subwatershed include livestock grazing and post-precommercial fuel treatments. Grazing management within riparian areas has changed within

the last five years. A stubble height pasture monitoring system for riparian areas is in place and incorporates a rest-rotation schedule for the Sunflower Allotment.

The 747 Fire was not considered in the fisheries cumulative (EHA) effects discussions for the following reasons: Proposed commercial salvage harvest activities and their connected actions would occur entirely within the Sunflower Subwatershed. This project would occur over 6 river miles away from Izee Falls. Effects from the Murray salvage sale activities on steelhead trout (as well as redband trout) residing below the falls are not measurable and not expected to have any lasting affects to population viability. Currently, Izee Falls on the South Fork John Day River is considered a natural fish barrier and, therefore is the upper limit of steelhead trout distribution within the basin. This project would occur over 6 river miles away from Izee Falls. Effects from the Murray salvage sale activities on steelhead trout (as well as redband trout) residing below the falls are not measurable and not expected to have any lasting affects to population viability.

A total of 4 retardant drops (5,000 gallons) were used during wildfire suppression activities on the Murray Fire. All retardant drops were approximately 400-500 feet from dry Class IV channels. Since there was no flow in these channels until February of 2002, the retardant had 7 months to deteriorate. For these reasons, there are no measurable effects to the aquatic environment expected from this activity.

Utilizing retardant on the Murray Fire was covered during emergency consultation with National Marine Fisheries Service (NMFS) concerning threatened Mid-Columbia steelhead trout. An informal concurrence letter has been issued.

There are future foreseeable actions that are expected to occur within the Sunflower Subwatershed that would be common to all alternatives for cumulative effects. The following summarizes these potential separate activities:

- As stated in the "Cumulative Effects Analysis" section, a fuels treatment Environmental Analysis is currently ongoing for the Sunflower area. The purpose of this project is to reduce hazardous natural fuel levels by prescribed burning and precommercial thinning.
- Removing the road prism at a Class IV drainage crossing. The identified prism is located on a spur road to the west of the 5800-573 in T.16S, R.26E, section 9. This activity would incorporate removing approximately 15 cubic yards of fill and hauling it to the Sunflower Pit. Currently, there is no passage of water from the drainage above the road to the drainage below the road. With a large runoff event there is good potential for road failure at this location. This activity would be funded by BAER dollars and would be implemented during dry weather conditions. Due to the location of the crossing (headwater area), there are no expected measurable sedimentation effects to water quality from this activity. Also, implementation during the summer should allow ample time for the soil to settle and allow vegetation to reestablish.
- Cleaning the culvert near the 5800-550 Road junction. This activity would be funded by BAER dollars and would be implemented during dry weather conditions. For those reasons discussed in the previous paragraph, there are no expected measurable adverse effects to water quality from this activity.
- Restoring the flood plain by removing part of the road prism on the 5800-551 Road stream crossing. This would be funded by BAER dollars and would be implemented upon completion of the Murray Fire Salvage Project. For those reasons discussed previously, there are no expected measurable adverse effects to water quality from this activity.

- Riparian planting is proposed to occur along Murray Creek in out-year planning. This activity would aid in protecting and improving water quality, primarily stream temperatures and sedimentation.

- Under Alternative 1, cattle grazing in the burned area within the Willow pasture would be rested June 1 to September 15, 2003 as part of the normal rest rotation schedule. Effects to water quality from grazing would continue to be monitored and managed to achieve an upward trend.

Alternative 1 - No Action

EHA: The EHA for the Sunflower Subwatershed would reside at 17.2% and exist at 12% in 2010 as the area continues to recover from past timber harvest and wildfire events. The present condition of the drainages (three class IV streams) within the planning area will likely remain stable (neither aggrading nor degrading) through implementation of this alternative. BAER activities have occurred in two drainages throughout the Murray Fire. These activities exist where soil conservation efforts were necessary as a result of high fire intensities. Expected overland runoff efficiencies would occur in short, high intensity peak(s). The BAER activities included placement of log erosion barriers within the floodplains and adjacent side slopes. Initial monitoring of these structures, in February of 2003, indicates the barriers were effective in intercepting overland flow and decreasing overall discharge intensity on the adjacent class IV stream channels. Interception rates are expected to improve as the fire area slowly recovers to an early seral vegetative state. Effects to fisheries habitat in Sunflower Creek (i.e. channel widening, bank erosion, loss of pools, etc.) are not anticipated from small un-measurable increases in peak flow resulting from the Murray Fire.

Alternative 2 - Proposed Action and Alternative 3

EHA: The cumulative effects analysis for both Alternative 2 and Alternative 3 reflects both salvage logging within the Murray Fire and proposed fuel reduction activities within the Sunflower Natural Fuels Environmental Analysis (EA). The Sunflower Natural Fuels EA would incorporate 13,938 total acres of prescribed burning and precommercial thinning. Of this, 1,582 acres would occur within various Class I, II, III, and IV RHCA. The Sunflower Natural Fuels EA proposed action would incorporate a variety of treatments including prescribed fire, precommercial thinning followed by prescribed fire, or precommercial thinning followed by two prescribed fire treatments. The 1,582 acres of RHCA would fall within at least one of these treatment types. RMO has not yet been identified/designed for these various treatment areas under the Sunflower Fuels Analysis project.

Potential cumulative watershed effects from implementing Alternative 2 and 3 would exist primarily from sediment yield to streams, and in-channel scour (laterally and horizontally) due to increased peak flows. Activities causing these potential effects would include fuel treatment projects adjacent to fish bearing channels and the resiliency of sediment due to overland flow from wildfire/salvage logging impacts with possible longer impacts from the additional harvest unit within this alternative. These effects would have compounding negative impacts (i.e. lack of spawning gravels and pool habitats) on fish populations residing in Sunflower Creek, Wildcat Creek, and Cougar Creek. However, the EHA analysis displays threshold values well below 20%, therefore, no cumulative impacts to drainages (measurable habitat altering conditions) within the Sunflower Subwatershed are expected. Fuel treatment activities occurring within riparian areas would have potentially more immediate impacts to channel form and fisheries habitat by increasing desirable forage species, thereby increasing livestock utilization.

The EHA for the Sunflower Subwatershed would reside at 17.2% in 2002 for both alternatives and would slowly increase reaching a peak of 16.6% in 2008 as fuel treatment measures were

implemented. EHA displays a decrease to 14.7% by 2012 as the subwatershed continues to recover from past logging activities, Murray Fire and salvage logging, and fuel treatments.

Biological Risk Assessment

This biological evaluation addresses the redband trout species. Redband trout reside on the Regional Forester's sensitive species list.

Aquatic Species Considered But Not Analyzed

Bull trout (*Salvelinus confluentus*) are a federally protected species (current Endangered Species Act status is "threatened") that historically occurred in various drainages throughout the John Day River basin. Currently, bull trout have been documented and occur on the Malhuer National Forest in headwater and mainstem drainages. Due to a lack of habitat, bull trout do not utilize tributaries within the Upper South Fork John Day River basin and were not further considered in this analysis. Westslope cutthroat trout (*Oncorhynchus clarki Lewis'i*) reside on the Regional Forester's sensitive species list but do not occupy habitats within the Sunflower Creek planning area and were not further considered in this analysis. The nearest Westslope cutthroat trout population occurs in Fields Creek on the Malheur National Forest. Brook trout are an Ochoco National Forest management indicator species. Brook trout do not occur within Sunflower Creek. Due to a lack of presence, brook trout were not further considered in this analysis. Steelhead trout are a Federally protected species; current Endangered Species Act status is "threatened". Essential fish habitat (EFH) for spring chinook salmon is federally protected (Magneson-Stevens Act). Due to the natural migration barriers at Izee Falls on the South Fork John Day River River, spring chinook salmon EFH was not further considered in this analysis. The Malheur mottled sculpin has been documented on the Malheur National Forest and resides on the Regional Forester's sensitive species list. This species has not been documented to occur in Sunflower Creek and was not further considered in this analysis.

Mid-Columbia Steelhead Trout

No documentation has occurred indicating steelhead trout utilize, or have ever utilized, Sunflower Creek. The nearest utilization within the river by steelhead occurs at (and below) Izee Falls, which is 0.98 river miles below the confluence of Sunflower Creek. The percentage of sediment (resulting from all previously identified alternatives) reaching steelhead habitat is not measurable and cannot be quantified with current particle distributions. The salvage sale activities would not retard attributes of fisheries habitat (RMO). The No Action Alternative and salvage activities within Alternatives 2 and 3 meet all Project Design Criteria (PDC) found within the 2001 Joint Programmatic Biological Assessment. The Biological risk assessment for Redband trout is available at the District office. The determination for this species is "May Effect – Not Likely to Adversely Affect."

Redband Trout

Inventories indicate aquatic habitat and redband trout populations occur in Sunflower Creek. Fish have not been observed or documented to occur in Murray Creek, which is .5 to 1 mile outside the Murray Fire project area. Acceleration in aquatic habitat degradation (outlined in the "Existing Condition" discussion) has adversely impacted population size and vigor. It is not known to what extend this has occurred. Sediment that would be produced from all previously identified alternatives is not measurable and cannot be quantified with existing particle distributions. The salvage sale activities would not retard attributes of fisheries habitat (RMO). The Biological risk assessment for Redband trout is available at the District office. The

determination for this species is "May Impact Individuals or Habitat, But Will Not Likely Contribute to a Trend Towards Federal Listing or Loss of Viability to the Population or Species."

Heritage Resources

The Presence of Prehistoric Archaeological Sites

Existing Conditions

Ethnographic information indicates several Tribes once used the project area: the Northern Paiute, representative of the Great Basin groups to the south, and the Warm Springs and Umatilla Tribes to the north. Members of the Confederated Tribes of the Warm Springs Reservation of Oregon continue to use the Ochoco Mountains, holding off-reservation treaty rights for fishing, hunting, gathering roots and berries, and pasturing livestock under the Treaty with the Tribes of Middle Oregon of 1855. Members of the Umatilla and Paiute Tribes continue to use the Ochoco upland resources as their ancestors once did. Archaeological excavations during the 1980s identified an area along Murray Creek (outside but adjacent to the project area) as reflecting an intermittent occupation for at least the last 5000-7000 years.

The area within the Murray Fire Salvage project area has been surveyed in the past for heritage resources. The previous inventories in the 1970s-1980s did not clearly document areas surveyed and are considered inadequate, for use in present-day inventories, according to standards set by the Forest Archaeologist and the State Historic Preservation Officer (SHPO). Two recent surveys have taken place: in 2001 during on-going work for the Sunflower Natural Fuels Reduction project, which encompasses the area burnt by the Murray Fire, and a survey of the project area in 2002 following the fire.

To date, only one isolated prehistoric artifact, an obsidian projectile point, has been found within this project area. This artifact was collected and sent to the laboratory for analysis and is curated at the Paulina Ranger District office.

No populations of cultural plants have been documented and no traditional use areas have been identified within the perimeter of the Murray Fire Salvage project area.

Environmental Effects

Alternative 1 - No Action

Direct Effects

The stand of damaged and fire-killed trees from the Murray Fire would remain until naturally replaced. Ground vegetation would be renewed through time. There are no known prehistoric resources that would be directly affected by Alternative 1. With this No Action Alternative, there would be less risk to possible prehistoric resources not yet located within the project area.

Indirect Effects

The nearest prehistoric site to the Murray Fire Salvage project area is approximately 322 meters to the southeast of the fire's perimeter. This site lies within an intermittent channel originating within the gently sloping ground of the project area. Under the No Action Alternative, existing

skid roads from past logging activities would remain open within the project area. Over time, natural soil erosion from these roads could detrimentally affect this archaeological site.

Alternative 2 - Proposed Action and Alternative 3

Direct Effects

There are no known prehistoric resources within the project area that would be directly affected by Alternatives 2 and 3.

Indirect Effects

Possible soil erosion from logging activities could adversely affect the prehistoric archaeological site lying in an intermittent channel southeast of the project area.

The Presence of Historic Archaeological Sites

Existing Conditions

The journals of Hudson's Bay Company employees indicate trappers were visiting the South Fork John Day drainage as early as the 1820s. Peter Skene Ogden's journal entry for January 11, 1826 stated that he crossed Hardscrabble Ridge (just north of the Murray Fire Salvage project area) and traveled to the South Fork John Day River (Minor, 1987). By 1862, men, supplies, and equipment were moving over the Yreka Road to the mining fields near Canyon City. One section of this road passes near Hardscrabble Ridge.

Through the 1860s, numerous U.S. Army encampments were constructed to the north and west of the present-day project area. Army personnel were stationed in this area to protect the encroaching miners and ranchers from Indians native to central and eastern Oregon. On August 12, 1865, Chief Paulina, of the Northern Paiutes, signed a treaty ceding his tribe's homeland. The boundary included the South Fork of the John Day River (ibid).

The Ochoco National Forest was created from the earlier Blue Mountain Reserve in 1911. In 1930, a 50-foot lookout tower and cabin were constructed on Hardscrabble Ridge. This structure was in use until 1968 when it was dismantled, and later telephone lines were removed from the Hardscrabble Butte to the Bernard Ranch.

The Sunflower Creek drainage was long used for stock grazing and ranching. In the late 1880s, the Delore family homesteaded just southeast of the project area. This area of the forest was also one of the last refuges of the open range for wild horses. In the 1950s, a small amount of timber harvesting took place for several local mills, followed by large-scale commercial harvesting beginning in the 1970s.

As discussed under Measure #1, the area within the Murray Fire Salvage project area has been surveyed in the past for heritage resources. The previous inventories in the 1970s-1980s did not clearly document areas surveyed and are considered inadequate, for use in present-day inventories, according to standards set by the Forest Archaeologist and the State Historic Preservation Officer (SHPO). Two recent surveys have taken place: in 2001 during on-going work for the Sunflower Natural Fuels Reduction project, which encompasses the area burnt by the Murray Fire, and a survey of the project area in 2002 following the fire.

Currently, there are no known historic resources within the Murray Fire Salvage project area.

Environmental Effects

Alternative 1 - No Action

Direct and Indirect Effects

There are no known historic resources within the Murray Fire Salvage project area to be directly or indirectly effected by the No Action Alternative for this project.

Alternative 2 - Proposed Action and Alternative 3

Direct and Indirect Effects

There are no known historic resources within the Murray Fire Salvage project area to be directly or indirectly effected by the proposed actions for this project.

Cumulative Effects for Heritage Resources

A heritage resource inventory has been conducted and completed for the Murray Fire Salvage project. There are no known prehistoric or historic resources within the project area.

Botany

Existing Conditions

There are no known occurrences of federally listed endangered or threatened plants within the analysis area. The Ochoco National Forest has no habitat recognized as essential for listed or proposed plant species recovery under the Endangered Species Act. There are 26 species on the Regional Forester's Sensitive Species List that are known to occur or have habitat on the Ochoco National Forest. Of the 26 sensitive species, six species have suitable habitat within the Murray analysis area. These species are listed in Table 36.

Table 36.
Sensitive species with suitable habitat within the Murray Fire Salvage Project Area.

Species	Habitat
Calochortus longebarbatus var. peckii	Seasonally wet meadow and stream margins
Astragalus tegetarioides	Ponderosa pine/juniper uplands
Astragalus diaphanus var.diurnus	Sagebrush-juniper steppe
Astragalus peckii	Sagebrush-juniper steppe
Penstemon peckii	Ponderosa pine forests
Thelypodium eucosmum	Dry slopes in vernal drainages/John Day soils

Calochortus longebarbatus var. *peckii* is managed with guidance from a draft Conservation Strategy for the Ochoco National Forest. The other species are not managed under Conservation Strategies.

Table 37 lists the 20 species on the Regional Forester's Sensitive Species list which do not have potential habitat, or are geographically unlikely to occur within the project area. These species would not be affected by the proposed project and will not be carried further in the analysis.

Table 37.
Sensitive plant species that do not have potential habitat within the Murray Fire Salvage Analysis Area.

Species	Habitat
Achnatherum hendersonii	Sagebrush scablands
Achnatherum wallowensis	Sagebrush scablands
Artemesia ludoviciana ssp. estesii	Riparian zones
Botrychium ascendens	Wet meadows/streams, springs, seeps
Botrychium crenulatum	Wet meadows/streams, springs, seeps
Botrychium minganense	Wet meadows/streams, springs, seeps
Botrychium montanum	Wet meadows/streams, springs, seeps
Botrychium paradoxum	Wet meadows/streams, springs, seeps
Botrychium pinnatum	Wet meadows/streams, springs, seeps
Calochortus longebarbatus var. longebarbatus	Seasonally wet meadow and stream margins
Camissonia pygmaea	Sagebrush steppe
Carex backii	Wet meadow/streams/springs/seeps/moist conifer forest
Carex hystericina	Stream banks/wet meadows
Carex interior	Stream banks/wet meadows
Carex stenophylla	Open, dry to moist grassy plains
Cypripedium calceolus var. parviflorum	Moist forest/riparian areas
Lomatium ochocense	Sagebrush scablands
Mimulus evanescens	Vernally moist meadows, springs and seeps
Rorippa columbiae	Wet meadows and streams
Thelypodium howellii	Sagebrush steppe/moist plains

Field Reconnaissance

Surveys for sensitive plants were conducted in July 1993 as part of the Sunflower Allotment Management Plan analysis. The Intuitive Control method was used. Additional field checks of this area were conducted in May and October of 2002. Records containing information on survey routes, surveyor, and results are on file at the Paulina Ranger District office.

Surveys did not document sensitive species within the project area, however suitable habitat for all six species in Table 36 does occur within or adjacent to, the Murray project area. *Acnatherum hendersonii,* and *Calochortus longebarbatus var. peckii* populations exist approximately four miles to the north. Suitable habitat for *Acnatherum hendersonii* does not exist within the project area.

Sensitive Plants

Acres of Harvest Disturbance

Existing Condition

The six sensitive species that occur or have suitable habitat within the analysis area are described below:

Calochortus longebarbatus S. Watson var. peckii Ownbey Peck's mariposa lily
Status: USF&WS: None
Natural Heritage Program: G4T2/S2
R-6 Sensitive Species List

Peck's mariposa lily is a local endemic to the Ochoco National Forest. It is a sterile triploid, which reproduces exclusively through asexual reproduction by the production of bulblets that form at the base of the plant (Fredricks 1986). The primary habitat of the plant occurs within open meadows and partially shaded to open riparian edges along seasonal and perennial streams. There is approximately 80 acres of habitat in the immediate vicinity of the project area.

The Oregon Natural Heritage Program (ONHP) globally and statewide ranks this species as T2, which means the variety is imperiled due to rarity, making it vulnerable to extirpation.

Astragalus tegetarioides M.E. Jones Deschutes milkvetch (bastard milkvetch)
Status: USF&WS: SoC
Natural Heritage Program: G3/S3
R-6 Sensitive Species List

Astragalus tegetarioides occurs in open stands of low and big sagebrush, and in openings, swales and canyon bottoms in ponderosa pine forests. Most populations occur in Harney County on the Snow Mountain Ranger District, Malheur National Forest. The ecological requirements for this species are not well known. Other members of the genus are considered early successional, somewhat fire tolerant species. The plant is often found in disturbed areas on level ground with gravelly soils over tabular basalt.

There is one known location of Deschutes milkvetch on the Paulina Ranger District, west of Rager Ranger Station. It is the northernmost known population in the species' range, making it an important population for species viability. There is approximately 242 acres of habitat within the immediate project vicinity.

The U.S. Fish and Wildlife Service Notice of Review (1997) lists Deschutes milkvetch as a Species of Concern. ONHP globally and statewide ranks this species as rare, but not immediately imperiled.

Astragalus diaphanus var. diurnus (S. Wats.) Barneby ex M.E. Peck Transparent milkvetch
Status: USF&WS: SoC
Natural Heritage Program: G4T2/S2
R-6 Sensitive Species List

Transparent milkvetch is found on barren sites with dark pumice basalt soils, at low elevations. The soils are often thin and gravelly, often over 50% bare ground.

There are six populations that occur on BLM land along the South Fork John Day River. There are two varieties of *Astragalus diaphanus*; the other is *Astragalus diaphanus* var. *diaphanus*. There is one population of this variety on the Paulina Ranger District, not far from the Murray project area. Although the probability of finding transparent milkvetch is low, the two varieties occupy similar habitat, and is therefore included. There is approximately 50 acres of habitat within the immediate project vicinity.

The U.S. Fish and Wildlife Service Notice of Review (1997) as Species of Concern. ONHP globally and statewide ranks this species as T2, which means the variety is imperiled due to rarity, making it vulnerable to extirpation.

Astragalus peckii Piper Peck's milkvetch
Status: USF&WS: SoC
Natural Heritage Program: G3/S3
R-6 Sensitive Species List

Astragalus peckii habitat consists of western juniper woodlands with bitterbrush and bunchgrasses. It occurs on loose sand or pumice soils on very dry sites. Slopes are generally flat at elevations averaging 3500'.

The nearest plant occurrence is in Deschutes County on the Deschutes National Forest. There is approximately 50 acres of low probability habitat within the immediate project vicinity.

The U.S. Fish and Wildlife Service Notice of Review (1997) lists Peck's milkvetch as a Species of Concern. ONHP globally and statewide ranks this species as rare, but not immediately imperiled.

Penstemon peckii Pennell Peck's penstemon
Status: USF&WS: SoC
Natural Heritage Program: G3/S3
R-6 Sensitive Species List
Peck's penstemon habitat is found in ponderosa pine forests between elevations of 2600 to 4900 feet. It requires wet site conditions for a portion of the growing season, which can occur as perennial wet ecotones, periodic flooding, or brief seasonal moisture, which can even occur as run-off. Soils are usually sandy loams, especially those formed from tills deposited in valley bottoms. Peck's penstemon appears to be closely associated with Quaternary alluvium, a geomorphologic type that holds more water than the surrounding areas of basalt (Vrilikas 1989).

Most populations of Peck's penstemon are found near Black Butte and the Sisters Ranger District on the Deschutes National Forest. There is an area of Quaternary alluvium and associated sandy soils a few miles to the east of the Murray project area (Gordon 2002). There is approximately 192 acres of low probability habitat within the immediate project vicinity.

The U.S. Fish and Wildlife Service Notice of Review (1997) lists Peck's penstemon as Species of Concern. ONHP globally and statewide ranks this species as rare, but not immediately imperiled.

Thelypodium eucosmum B.L. Robins. arrow-leaf thelypody
Status: USF&WS: SoC
Natural Heritage Program: G2/S2
R-6 Sensitive Species List

This plant is mostly found in shaded or moist sites in a variety of habitats, from small basalt drainages along stream banks, hillside seeps, to isolated occurrences under juniper with no obvious surface moisture. Plants will grow in partial shade or full sun. It is typically found in the juniper/sagebrush plant associations. Elevation ranges from 1800 to 5000 feet.

There are 8 sites in Grant County and 13 in Wheeler County. Murderers Creek on BLM and Malheur National Forest land are considered high probability habitat areas. There is approximately 20 acres of low probability habitat within the immediate project vicinity.

The U.S. Fish and Wildlife Service Notice of Review (1997) as Species of Concern. ONHP globally and statewide ranks this species as imperiled due to rarity, making it vulnerable to extirpation.

Environmental Effects

Alternative 1 – No Action

Direct and Indirect Effects

Impacts to sensitive plant habitat occurred as a result of the fire. Within the commercial timberland (ponderosa pine) the fire burned intensely and consumed most of the surface vegetation and the duff layer; most trees within the area were also killed. Areas within juniper steppe and scablands burned in a mosaic at varying intensities, but generally a portion of the herbaceous and litter layer remained. It is difficult to determine whether the fire impacts will be positive through site rejuvenation, or negative through site degradation. Much depends on weather events during the winter and spring of 2003, which could cause overland flow and erosion effects. These sensitive species are mostly early seral species that evolved with periodic fire occurrence. However, the habitat is out of the range of natural variability due to fire suppression and lack of stand management. This caused abnormally high tree densities and as a result, a stand replacement fire, a rare occurrence in ponderosa pine. No additional ground disturbance would occur under this alternative; therefore adverse direct effects to habitat of the six species listed in Table 36 would not occur. For Alternative 1, a "No Impact" determination is expected on the viability of plant populations listed in Table 36.

Alternative 2 – Proposed Action and Alternative 3

Direct and Indirect Effects

Alternative 2 proposes harvest on 139 acres in three units, and alternative 3 proposes 157 acres of harvest in four units. No direct or indirect effects to any individuals listed in Table 36 would occur, as there are no sensitive plant populations within the area. The following analysis is for effects to sensitive plant habitat.

Harvest: Direct effects to Peck's mariposa lily habitat would not occur under this alternative. Riparian buffers exclude harvest within a minimum of 50 feet of streams or meadows, which encompasses lily habitat. Existing skid trails, haul roads and landings would be used in all units. Indirect effects to lily habitat will increase slightly due to removal of dead trees, which would disturb the soil further from logging equipment, causing a short-term increase in sedimentation.

Harvest effects to Deschutes milkvetch and Peck's penstemon habitat would be minimal. Direct and indirect effects to habitat occurred as a result of the wildfire. Additional effects from removing trees would be a slight, short-term increase in soil disturbance.

Harvest would not affect transparent milkvetch, Peck's milkvetch, or arrowleaf thelopody habitat, the harvest would occur in ponderosa pine dominated timber stands. Harvest would not occur within these species' habitat.

Roads: There would be a stream crossing for log trucks using an existing road adjacent to unit 2. No reconstruction or maintenance is necessary to protect the streambed and prevent erosion; the

road can be used as is. A design element restricts equipment to the existing road prism; therefore there would be no additional effects to Peck's mariposa lily habitat. Indirect effects from short-term sediment flow may affect habitat at the stream crossing (less than ¼ acre). Road 5800-245 would be used to an existing landing outside the harvest area. This was done to use existing skid trails to log Unit 1 without creating additional disturbance. Although it is beneficial to habitat to not compact soil, there would be a short-term negative effect to existing vegetation. This area did not burn severely, so much of the ground vegetation is intact and the previously used skid trails have been re-vegetated through time. This vegetation would be disturbed, which can affect infiltration rates and changes in microclimate.

Approximately 1.0 mile of system roads 5800-245, 5800-551, 5800-573 and 5800-575, which includes the crossing discussed above, would be closed after the timber sale to prevent further use. These roads were opened during fire suppression activities; preventing use, installing run-off control measures and increasing roughness would be a long-term benefit to sensitive plant habitat.

Table 38. Acres of Logging Disturbance to Sensitive Plants by Alternative

Plant Species	Acres of Habitat/ Probability	Alternative 1	Alternative 2	Alternative 3
Peck's mariposa lily	80 / moderate	0 acres	0.25 acres	0.25 acres
Deschutes milkvetch	192 / moderate	0 acres	139 acres	157 acres
Deschutes milkvetch	50 / low	0 acres	0 acres	0 acres
Transparent milkvetch	50 / low	0 acres	0 acres	0 acres
Peck's milkvetch	50 / low	0 acres	0 acres	0 acres
Peck's penstemon	192 / low	0 acres	139 acres	157 acres
Arrow-leaf thelopody	20 / low	0 acres	0 acres	0 acres

Cumulative Effects on Sensitive Plant Species

The fire occurred on an area that the Forest Service acquired during a land exchange in 1995. The previous landowner was a timber company, and the area was harvested by an overstory removal in several entries. There is an extensive skid trail, road, and landing system throughout the area, and as a result, extensive compaction and soil disturbance has occurred, reducing the quality of sensitive plant habitat. In addition, stand densities were high, closing canopies, which somewhat mimics a late seral condition with less sunlight reaching the forest floor. This in combination with lack of intermittent fire degraded species habitat. Roads impact riparian habitat via altering stream drainage patterns by confining the stream so floodplain interaction is disturbed. This in turn affects riparian habitat and its function. It is speculated that Peck's mariposa lily is spread by bulblets moving downstream during high water flow. Roads that cross drainages can affect bulblet dispersal. Observations show that altering the hydrology of stream channels is one of the largest threats to Peck's mariposa lily (Fredricks, 1989). Closing the roads affecting lily habitat will be a long-term benefit.

The fire was a stand replacement event. In many patchy areas the soil received enough intense heat to change the soil structure and characteristics, however hydrophobic soil was rated as 11% high, 11% moderate, and 77% low, which is lower than expected. Such an intense fire may affect upland sensitive plant habitat. These species adapted with a recurring low intensity fire every 7-15 years, not a fire of this intensity. The plant associations for this area include the climax species elk sedge and pinegrass. Both are rhizomatous and respond vigorously to fire. This will

help with sedimentation issues, but may also dominate the site, lowering species diversity. Effects to Deschutes milkvetch and Peck's penstemon habitat may be detrimental through reduced site productivity and future competition. The Class 4 riparian channels are rocky swales with scattered sedge patches along with some riparian grasses that were heavily grazed. This prevented ground vegetation from burning intensely in these areas and did not affect Peck's mariposa lily habitat. A major runoff event would pose a possible threat to Peck's mariposa lily habitat. Log erosion barriers installed after the fire, and the fact that slopes are gentle and the soil has a low erosion hazard rating, have mitigated this potential.

The use of 5,000 gallons of fire retardant, Fire-Trol LCG-R, during the fire suppression may have subtle long-term effects on species diversity. Studies (Larson and Newton, 1996; Hamilton, 1998) show that ammonium polyphosphate- based retardant depresses species richness. It is not known how persistent this effect is and what the result to sensitive species habitat may be. The study further concluded that if there is sufficient moisture the first year, some species, such as grasses, might increase in biomass production. This effect decreases by the second year. The dry winter of 2003 may not produce enough moisture to stimulate this effect.

The proposed activities would only slightly increase the short-term impacts to Peck's mariposa lily, Peck's penstemon and Deschutes milkvetch habitat. The table above shows the amount of disturbance by logging activities that would have minor, short-term impacts on habitat. There are no cumulative effects expected for increased peak flow or overland flow. There would be minor, non-measurable short-term effects from localized sedimentation to the stream channel (see Hydrology Report, Analysis File). The proposed activities would have no effect on the other three species listed in Table 36.

Cattle grazing within the fire area in the immediate future would be detrimental to vegetative recovery of the site. Repeated removal of leaf material and trampling can permanently deplete nutrient reserves in perennial non-rhizomatous plants. Grazing of newly germinated plants can completely uproot individuals. The interdisciplinary team reviewed the site conditions and made the determination, under Alternatives 2 and 3, to rest the burned area from grazing for a period of two seasons (2003, 2004) or until monitoring confirmed the grass communities have re-established.

Removing the fill, which would reconnect the stream channel, an action that would benefit Peck's mariposa lily, would close one of the existing roads in unit 3 that crosses a Class 4 stream channel. Completion of this work is scheduled for the fall of 2003.

Another action in the foreseeable future is the Sunflower Natural Fuels Project. The Sunflower watershed will be managed for natural fuels reduction through prescribed burning and tree density reduction through precommercial thinning. The area surrounding the Murray Fire is scheduled for underburning and some precommercial thinning in 2005 under the proposed action. The long-term effects of these actions should be beneficial to sensitive plant habitat by reducing fuel loads and stand densities more in line with the historical range.

Summary

Taking short term and cumulative impacts into consideration, the determination is that Alternatives 2 and 3 "May Impact Individuals or Habitat but will not Likely Contribute to a Trend Towards Federal Listing" for Peck's mariposa lily, Peck's penstemon and Deschutes milkvetch.

All other habitat for species listed in Table 36 has a determination of "No Impact," because the project does not propose activities within their habitat.

Noxious Weeds

Disturbance By Harvest Activities and Risk Potential

Existing Condition

The Forest Service broadly defines noxious weeds as all invasive, aggressive, or harmful non-indigenous plant species (PNW Weed Management Strategy, 1999). These species have the ability to spread into natural habitats where they displace native species. Most infestations begin on disturbed areas, such as roads, harvest landings, and recreation areas. Since these species are introduced to the United States, there are no native biological control agents to keep the plants from rapidly invading native plant communities.

The primary introduction of noxious weeds is through vehicles. Other sources of introduction and spread include water, wildlife, wind, cattle, and heavy equipment used for logging, road maintenance, and restoration activities.

Some noxious weeds on the District are being treated under the 1995 and 1998 Ochoco NF Integrated Weed Management Environmental Assessments (Weed EA). Control methods include manual hand pulling and grubbing, herbicides, and biological agents. The Weed EA identifies treatment sites that follow a few major roads on the district. These treatment sites allow the use herbicide to control certain species of noxious weeds. Of the 2.6 miles of system roads within the analysis area, there are 0.65 miles available for treatment, which includes the 5800 Road. Species available for herbicide treatment along these roads is limited to the knapweeds. The Forest Weed EA does not allow herbicide treatment of sulfur cinquefoil.

Adjacent to the Murray Salvage project area there are five weed sites encompassing 1.5 acres. These infestations are located along or adjacent to the 5800 and 5800-550 Roads. Table 39 lists the weed species and acreage. These sites are currently being treated under the Forest's Weed EA. The knapweed sites have been treated yearly with herbicides since 1998. Within the last two years, the number of knapweed individuals have been greatly reduced, one location to where manual treatment is effective to maintain control of the population. *Potentilla recta* is currently a no-treatment species on the District. It is difficult to distinguish it from native *Potentilla* species, and it grows in wet riparian areas, making it difficult to control. Of the weed infestations listed in Table 40, all but the sulfur cinquefoil populations are considered stable, and are not increasing at this time.

Table 39. Noxious weed infestations adjacent to the Murray Fire Salvage project area.

Scientific Name	Common Name	Number of Infestations	Acres	Acres Available for Herbicide Treatment
Centaurea maculosa	Spotted knapweed	3	0.5	0.5
Potentilla recta	Sulfur cinquefoil	2	1.0	0

Along the travel route to the project area (the 5800 Road), there are several sizeable knapweed populations not included in the 1.5 acre figure for the project. These infestations are also being

treated with herbicides under the Weed EA and are considered stable due to decreasing weed numbers. Each year, however, plants occur throughout the infestation area from the seedbank.

Table 40. Noxious weed infestations along the travel route to the Murray Fire Salvage project area.

Scientific Name	Common Name	Acres	Ac Available for Herbicide Treatment
Centaurea diffusa	Diffuse knapweed	0.5	0.5
Centaurea maculosa	Spotted knapweed	1.5	1.5
Potentilla recta	Sulfur cinquefoil	0.5	0

The fire burned hot, consuming all vegetative material burning down to mineral soil over 70% of the burned area. The vegetation within the juniper steppe, scablands, along scabland edges, riparian areas, and meadows survived a moderate burn that did not totally consume vegetation. The period between fire ignition and snowfall (July-November) is a time where the probability of weed establishment was high. During this period, repeated travel over the site for fire suppression, mop-up and rehabilitation activities by heavy equipment and personnel, increase the chance of weed seed becoming established on the exposed mineral soil. Suppression equipment used on the Murray Fire came from the 747 Fire, a 17,000 acre fire that burned at the same time as the Murray Fire. Over 300 vehicles were used on the 747 and Murray Fires for a period of four weeks. Equipment and vehicles used on the fires came from 11 different states, all of which have noxious weeds that occur on the Oregon noxious weed list. Several of these states, such as California and Montana, have severe problems with highly invasive weeds such as yellow starthistle and leafy spurge. To further compound the potential risk, the area impacted by the 747 Fire has many known noxious weed sites (see Table 41) where weed material and seed could have been transported to the Murray Fire. Vehicle cleaning prevention measures were not used on either fire to reduce the risk of weed spread.

Table 41. Known Noxious Weed Infestations within the 747 Fire Area

Scientific Name	Common Name
Hypericum perforatum	St. John's-wort
Cynoglossum officinale	Houndstongue
Dipsacus sylvestris	Teasel
Taeniatherum caput-medusae	Medusahead rye
Onopordum acanthium	Scotch thistle
Cardaria draba	Whitetop
Centaurea diffusa	Diffuse knapweed
Centaurea maculosa	Spotted knapweed
Cirsium arvense	Canada thistle

Environmental Effects / Risk Assessment

Alternative 1 – No Action

Direct and Indirect Effects

The No Action alternative has a high risk for weed introduction and spread due to previous events including the fire, fire suppression and rehabilitation efforts (see Appendix 1, Botany Report, Analysis File for further information). There are existing knapweed populations along the main roads (5800 and 5800-550) that were disturbed during suppression activities. The weeds occur at wide spots along the road that are convenient places to park vehicles and stage equipment. This has the potential to spread the existing seed bank. Due to the amount of bare ground exposed by the fire and the amount of traffic and equipment used within the fire area, including off-road, the potential for noxious weed introduction is likely. Spread of existing weed infestations along the 5800 Road would be treatable with herbicides under the Weed EA. New weed infestations along the 5800 Road (other than knapweed) or infestations outside the 5800 Road corridor would not be treated by any method without further NEPA analysis. In the long-term, weed introduction and spread would also continue through road maintenance, cattle grazing, forest visitors, or natural vectors such as wind, wildlife, and water dispersal.

Although the no action alternative has high risk, it has the least potential of the alternatives for additional risk of spreading and introducing noxious weeds, as there would be no additional soil disturbance, log hauling or equipment on site.

Alternative 2 – Proposed Action and Alternative 3

Direct and Indirect Effects

Besides the weed risk described under Alternative 1, both Alternatives 2 and 3 have further potential to increase this risk. Vehicles and equipment are vectors that can introduce new weed infestations and spread existing infestations. This potential exists for activities including: timber harvest, log hauling, and road closures. Most of the risk of weed introduction from heavy equipment is mitigated through design elements that require cleaning before entering National Forest System land. Vehicles however, including Forest Service vehicles, and trucks used for log hauling, are exempt from this requirement, and therefore still pose a risk. Potential effects to native habitat through spread of known weed sites are similar for both action alternatives. The junction of the 5800 and 5800-550 roads has a knapweed population that has the most potential for spread of the five weed sites within the project area. A design element was developed to avoid heavy impacts (parking, landings) to the area, which mitigates spread potential somewhat. However, log hauling for units 2 and 3 would disturb this weed site. Alternative 3 has slightly more risk since an additional six acres of timber would be hauled along this site compared to Alternative 2. Log haul past the large knapweed population along the 5800 Road (outside the planning area) would be the same for both action alternatives, with more trips resulting from Alternative 3. See Table 42 for a comparison of alternatives.

Additional activities proposed for both action alternatives, include road closures and planting tree seedlings. The native surface roads would be closed to prevent further traffic. A design element was developed to seed these roads and the landings to provide competition against noxious weeds. Planting tree seedlings within the burned area is also proposed under the action alternatives, this would also help occupy the site and would help reduce weed invasion.

The public voiced an issue during scoping to consider the advice of the "Beschta Report". Beschta et al. states, "Seeding grasses into burned forests has been shown to disrupt recovery of native plants, and is likely to create more problems than it solves." The only area proposed for seeding are the roads and landings. This equates to approximately 5 acres, or 1.6% of the burned area. Roads and landings are disturbed sites that have the highest potential of being colonized by noxious weeds of anywhere within the burned area. They also are the least likely areas to recover naturally. Native seed would be used if possible, if not, native seed cultivars would be used. Species would be based on existing vegetation and appropriateness for the xeric ponderosa pine environment, such as bluebunch wheatgrass and bottlebrush squirreltail. This would not result in entirely new, exotic flora. Everett (1995) states that on sites already outside the historic range of variability, their ability to recover on their own may be impeded. Seed reserves may be depleted and the soil mantle damaged, waiting for recovery may result in noxious weed invasion and sedimentation into stream channels.

Overall Alternative 3 has the most risk for weed introduction and spread because it harvests the most timber. Prevention measures (design elements) reduce this risk; un-mitigated risk includes log haul and re-use of landings that were previously revegetated and did not burn. The weed risk for Alternatives 2 and 3 are only slightly higher than the risk of the no action alternative. All of the alternatives rate as high risk for weed introduction and spread (see Appendix 1 of the Botany report in the analysis file for the risk analysis and prevention measures).

Table 42. Alternative Comparison for possible noxious weed introduction

Alternative	Acres of Harvest	Approximate Number of Log Truck Trips	Miles of Road Closure and Seeding	Approximate Acres of Planting
1	0	0	0	0
2	139	129 Roundtrips	1.05	140
3	157	145 Roundtrips	1.05	140

Cumulative Effects

The existing weed infestations within and adjacent to the project area were discovered in 1997. Their origin is unknown. These areas have been treated with herbicide yearly, which has reduced the number of plants considerably. The seed bank is still viable and treatment continues on a small scale. This treatment reduces, but does not eliminate, the risk of spread.

The fire created the greatest potential for weed introduction. For the most part it burned the ground vegetation completely, which has a two-fold affect. Native vegetation is no longer occupying the site to provide competition for noxious weeds and the fire created a seedbed of bare soil for potential germination of noxious weed seed. Roads that were previously closed and weed-free were used in fire suppression and were left open to traffic. Dozer lines constructed to stop the fire were rehabilitated and seeded with native grass seed (cultivars) in the fall of 2002 to increase soil productivity. This action will also provide some competition in the event weeds invade the site. During fire suppression, 5,000 gallons of an ammonium polyphosphate-based retardant were dropped on the site. Fire retardant is shown to reduce species richness. Studies showed this effect in both shrub steppe and mixed-grass prairie ecosystems. It is unknown how persistent the decline of species diversity will be. The studies also showed that weedy species could exploit the additional nitrogen on the site and gain an advantage over more desirable native plants (Hamilton et al 1998).

The proposed harvest activities slightly increase the risk for weed introduction and spread. Prevention techniques through design elements and the current weed treatment program will help reduce increased cumulative effects of the Murray action alternatives. See Appendix 1 of the Botany report in the analysis file for prevention measures and control strategies for noxious weeds used in this project.

An action that is foreseeable in the short-term is the Sunflower Natural Fuels project. This is a proposal to reduce stand density and fuel accumulation through precommercial thinning and underburning. No commercial harvest is proposed. Expected burning outcomes include a 40-60% reduction in the litter layer. Approximately 18% of the watershed would be treated each year in years 1, 2, and 4. Year 3 proposes to treat 20% of the watershed. Treatment is scheduled to begin in 2004. Under this scenario the risk of weed introduction is low, with the highest potential coming from Forest Service vehicle traffic.

Cumulative impacts of travel on forest roads by visitors and forest workers would be detrimental to native vegetation through the spread of noxious weeds. Human use on the forest is expected to increase in the future. Recreation use on Paulina Ranger District is currently increasing, especially from August through November during hunting season, and is expected to increase in the future as populations in nearby towns continue to grow. Late hunting season is a wet time of year and is particularly conducive to weed increase due to mud clinging to tire tread and the potential germinating ability of the bare ground exposed on the project area. Weed populations surrounding the Forest are increasing in magnitude and variety of weed species. The use of herbicide and biological control on new sites is not expected within the near future due to current litigation of vegetation management proposals within the Region. Manual control is not effective on many species, including (from Table 41) medusahead rye, St. John-wort, Canada thistle, and whitetop.

The fire created the principal risk for an increase in noxious weeds. Vehicles from many states impacted the fire area with no prevention measures in place to reduce this risk. Cumulative impacts in the area would result in increased weed populations. The additional risk of the salvage project would not be a substantial impact.

Visual Resources

Existing Condition

Forest Road 5800 has always been the primary gateway, access, and entry point for the public into the Murray Fire Salvage Project area.

This is a landscape of gentle rolling hills set amongst Ponderosa pine stands with intermittent streams and drainages that is part of the John Day River watershed. It is a landscape of strong line, form, color, and texture elements from landscape components, such as rock outcrops, gentle rolling hills, ridges, and various tree and shrub species.

In general, the area consists mostly of second growth ponderosa pine with occasional large yellow-barked Ponderosa pine stands mixed in amongst undergrowth components include bitter brush, ceanothus, elk sedge, and grass species. Virtually every scenic component within this project area has been altered since the wildfire of 2002.

Currently, the existing landscape character within the Murray Fire Salvage Project consists mostly of pockets of moderate to severely charred forest. However, in some pockets the fire naturally burned various "mosaic" patterns. This condition helps maintained moderate scenic integrity level within the low to moderately burned forests.

The effect on scenic resource from Murray Fire is going to be long-term, at least until a new green forest has replaced one destroyed by fire.

Distance Zone

There is only one viewing distance zone that falls within the project area as viewed from Road 5800 access and travel corridor. The Road 5800 travel corridor is being viewed as a foreground landscape (0 to 600 feet) viewing area.

Environmental Effects

Landscape Character and Scenic Integrity Level

Direct and Indirect Effects

The proposed activities assume vegetative and fuel management direction that, upon implementation, would create an altered and different forest character than the existing character.

The effect on scenic resources from the proposed alternatives, specifically on landscape character, scenic quality, and scenic integrity level, can be classified into two specific categories. The first is short-term effect (within landscape term of 0-5 years) or alteration of landscape character and scenic integrity level. The other is long-term effect (from 5 years and beyond) or alteration.

The effect from the proposed management activities is expected to be most evident to the visiting public within the "Immediate" Foreground landscape (0-300 feet) and Foreground landscape (300 feet to 600 feet on each side of the road) of the Road 5800 scenic corridor.

The unit-of-measure for the environmental effect(s), specifically on Scenic Resources from the proposed management activities under each alternative, can be categorized into two distinctive areas. They are: 1) Acres (or percentage) of alteration, including improvement or enhancement of scenery; 2) Acres (or percentage) of affected or alteration on short-term scenery within the Foreground as viewed from a travel corridor following implementation. This effect analysis is taking into consideration, for both the short and long-term affect on landscape character, scenic quality, and the overall scenic integrity level within the Murray Fire Salvage Project.

Alternative 1 - No Action

Under this alternative, an estimated 321 acres (100%) of the existing burned vegetation within the analysis area would not be managed, altered, or changed by proposed management activities. The natural and ecological processes, such as insects, diseases, fuel build up (that may lead to yet another catastrophic wildfire), wind throw, snow damage/break, and dead and down trees would be allowed to continue unmanaged. The current management actions would continue as is (e.g. management of recreation use and services, fire suppression, hazard trees, standard road maintenance and re-closure of breached roads, etc…). No actions would be taken to reduce risk at a landscape-scale.

Scenic quality, scenic integrity level, and landscape character would remain the same and may be adversely altered through time. The short-term scenic quality would remain unchanged under this alternative. However, the current vegetation condition would continue to degrade, affecting long-term scenic quality, forest health, and also public safety.

Under this alternative, Ochoco National Forest LRMP directions (the Desired Future Condition for Scenic Resources [MA-F26]) within the Murray Fire Salvage Project would NOT be met.

Alternative 2 - Proposed Action

Under this alternative, the proposed management activities, such as the commercial salvage of damaged and killed trees, would occur in areas within the Road 5800 scenic corridor.

Approximately 139 acres (or 43.3% of 321 total burned acres) would be treated. Within proposed units 1, 2, and 3, approximately 9.95 acres (or 7.2% of the total 139 acres to be treated) fall within the Foreground Scenic View allocation area and would be treated under this alternative. The proposed salvage activities in these three proposed units would have a direct effect on the Foreground Scenic Views.

The effect on short-term (landscape term of 0-5 years) scenic quality is expected to be minimal and should be subordinated to the existing landscape character. The "natural appearing" landscape character is expected to be slightly altered from the existing scenic condition. Visual disturbance is expected to be visible to a casual forest visitor during the salvage harvest. Native shrub and grass species followed by the natural regeneration and/or planting of pine seedlings are expected to thrive soon after the completion of this project. Little to no visual disturbance (or scaring) of the landscape is expected to be visible one year following treatment under this alternative.

The effect on long-term (5 years and beyond) scenic quality is expected to be greatly beneficial to scenic resources from the proposed management activities. Enough residual trees are expected to remain in place, including live trees with full crown and smaller burned/dead trees still standing, to meet Foreground scenic quality standards and guidelines. Following treatment, the landscape character, scenic integrity level, and scenic quality are expected to be slightly altered from their existing conditions. Visual disturbance is not expected to be visible to a casual forest visitor during the long-term as disturbance to the landscape character would no longer be noticeable.

Under this alternative, the Ochoco National Forest LRMP directions for Scenic Resources (MA-F22) within the Murray Fire Salvage Project would be moving closer toward the Desired Future Scenic Condition.

Alternative 3

Under this alternative, the effect on scenic resources is very much similar, in scale and in scope, to Alternative 2.

Approximately157 acres (or 49% of 321 total burned acres) would be treated. Within proposed units 1, 2, 3 and 4, approximately 18.67 acres (or 11.9% of the total 157 acres to be treated) fall within the Foreground Scenic View allocation area and would be treated under this alternative. The proposed salvage activities in these four proposed units would have a direct effect on the Foreground Scenic Views.

The slight modification of proposed management activities under this alternative is expected to slightly alter the existing scenic quality, scenic integrity level, and landscape character. The effect on both short-term and long-term scenic resource is very much comparable to Alternative 2, the Proposed Action Alternative.

Under Alternative 3, the Ochoco National Forest LRMP directions for Scenic Resources (MA-F22) within the Murray Fire Salvage Project would be moving closer toward the Desired Future Scenic Condition.

Transportation

Existing Condition

Forest Development Roads provide access to National Forest lands and are classified as arterial, collector, and local roads. Arterial roads serve large land areas, primarily providing the main access into the Ochoco National Forest, and usually connect to public highways. Collector roads simply "collect" traffic from forest local roads. Local roads connect terminal facilities with forest collector, arterial, or public highways, and provide minor linkage with other roads. Murray Fire Salvage Planning Area has approximately .65 miles of arterial and collector roads.

Generally, depending on the type of travel for which they are maintained, roads can be placed in the following categories:

- Storage or closed category for resource protection and safety reasons (1.1 miles)
- High clearance vehicles (pickups, all purpose vehicles) (.9 miles)
- Suitable for use by low clearance vehicles (passenger cars) (.65 miles)

Open roads within the Murray Fire Salvage Planning Area total approximately 1.55 miles, or an open road density of 3.1 miles per square mile. The entire open road density is within the Sunflower Creek Subwatershed. To date, approximately 1.05 miles of roads within the Planning Area have been closed or decommissioned.

Alternative 1 – No Action

Under this alternative, no new construction, reconstruction, temporary road construction, decommissioning, or road closures would take place. During the Murray Fire suppression activities, closed system roads 5800-573 and 5800-575 were opened to access the southern portions of the fire. These roads would not be closed under this Alternative, possibly adding 1.0 mile of open road density to the Planning Area. The opening of these roads could encourage more traffic use with the potential of more road degradation, possibly having more impact on other resources.

Alternative 2 – Proposed Action and Alternative 3

Under these alternatives, no new construction, reconstruction, or temporary road construction would take place. Basic roads maintenance would occur prior to and after haul is completed.

The 1.3 miles of closed system roads (5800-245, 5800-551, 5800-573, and 5800-575) that were opened, for fire suppression or proposed logging activities, would be closed. One, or a combination, of the following hydrological methods would be used; remove existing berms, water barring, scarification, tree felling on road prism, and seeding. Closed roads would be treated to reduce or eliminate existing sediment sources, improve water infiltration, increase vegetation on the road surfaces, and other means to improve watershed conditions. Existing landings and skid trails would be used to reduce soil disturbance and compaction. Where possible, landings would be scarified and seeded.

Grazing

Existing Condition

The Murray Fire, and the corresponding proposed project area, is within the Sunflower Allotment. This allotment has 738 cow/calf pairs and is managed on a rest-rotation grazing system with a season of use from June 1 to September 15. The majority of the Murray Fire occurred within the Willow pasture with minor amounts on the Frazier and Murray holding pastures (all within the Sunflower Allotment). The Willow pasture is scheduled to be rested during the upcoming 2003 grazing season in accordance with the rest-rotation schedule outlined in the allotment management plan. The Sunflower Allotment is currently monitored for stubble height in the riparian areas in accordance with Pacfish/Infish.

Environmental Effects

The fire effects on forage availability are linked closely with the burn intensities. Areas that experienced low to moderate burn intensities are likely to show an increase in forage production due to the beneficial effect of a low/moderate intensity, short duration fire. The areas that received a high burn severity will see lower forage production values until grass and forb communities can reestablish on the site. The burned area would benefit from an extended period of rest to allow plant communities to reestablish without livestock caused stress. The Willow pasture is scheduled to be rested in 2003 and the burned area within the Willow pasture will receive two full growing seasons of rest (2003, 2004) or until monitoring confirms the grass communities have re-established.

Alternative 1 – No Action

Direct and Indirect Effects

There are no direct and indirect effects to grazing from the No Action Alternative. The primary effects were on the vegetation from the Murray Fire. This pasture was previously scheduled for rest during the 2003 grazing season. Grazing within the burned area would resume in 2004.

In the long term (25+ years), downed trees would hinder access to the area by livestock.

Alternative 2 and Alternative 3

Direct and Indirect Effects

The proposed activities would have little direct or indirect effects on grazing in the Willow Pasture. The 2003 grazing season is the regular rest period for this pasture under the current

Allotment Plan. No grazing would occur. The action alternatives allow a longer recovery period for the burned area by utilization of a drift fence. The area to be enclosed by the drift fence accounts for less than eight percent of the Willow Pasture and would not affect the normal grazing routine. Pasture moves will continue to be determined by stubble height measurements and overall pasture condition as outlined in the annual operating instructions.

Temporary drift fences would be designed and installed for the 2004 grazing season to prevent livestock from trailing through or to force the animals to utilize a different area. A two-strand electric fence utilizing fiberglass stakes would be constructed around the 321 acre Murray Fire perimeter before livestock are introduced and would be removed at the end of the grazing season. This would effectively exclude livestock from the burned area and enhance vegetation recovery during the grazing season. This is in keeping with the Beschta Report, which recommends, "Do not take actions which impede natural recovery of disturbed systems."

Cumulative Effects

Historical livestock grazing programs have lead to rangeland resources in poor condition due to overuse of the forage base, soil compaction, and bank trampling. The present day grazing program has monitoring protocols that have improved the condition of rangeland resources, especially in the riparian areas. These ongoing monitoring protocols, combined with the proposed Murray Salvage project and the proposed Sunflower Fuels project, should provide an increased amount of forage in the area after sufficient rest has taken place. This increase in the forage base is expected to continue for a number of years until the forest canopy reestablishes itself.

Chapter 4

COMPLIANCE WITH EXISTING FOREST PLANS, REGULATIONS AND POLICIES OF OTHER JURISDICTIONS, INCLUDING LOCAL COMPREHENSIVE PLANS

The regulations for implementing NEPA require a determination of the possible conflicts between the Proposed Action and the objectives of federal, state and local land-use plans, policies and controls for the area. The alternatives discussed in this EA are generally compatible with local governmental plans.

Environmental Justice

No environmental justice issues related to the proposed activities were identified. There are no disproportionately high or adverse human health effects on an identifiable low-income or minority population or subsistence lifestyle. Due to the small scale of this proposed project, no alternatives are expected to impact these populations. The proposed activity work in the action alternatives (timber harvest, planting, road closures) would, however, support any rural low-income or minority populations in providing employment opportunities.

Prime Farmland, Rangeland, Forestland

The proposed alternatives would have no impact on prime farmland, rangeland, or forestland because none of these lands occur within the project area.

Floodplains and Wetlands

The proposed alternatives would have no impact on floodplains or wetlands as described in Executive Orders 11988 and 11990.

Civil Rights and Environmental Justice

Civil Rights legislations, especially the Civil Rights Act (CR) of 1964, Title VI, prohibit discrimination in Forest Service program delivery. The Civil Rights Act underlying principal is no activity shall negatively affect minorities, women, or persons with disabilities by virtue of their race, color, sex, national origin, religion, age, disability, or material or familial status. Environmental Justice (EJ) Executive Order 12898 demands the fair treatment and meaningful involvement of all people, defined as no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from the execution of our actions. EJ focuses on minority, low-income groups, and subsistence lifestyles (including Indian Tribes). The purpose of involving these groups (EJ) and analyzing the effects upon them is to determine whether adverse civil rights impacts (CR) are anticipated, or whether disparate or disproportionate impacts associated with the alternatives is anticipated on any of these groups (CR/EJ).

With this project, there is no known potential for disparate or disproportionately effects, or to discriminate or negatively impact any individual or subset of the population described above. Tribal rights (ceded lands) and Tribal traditional uses were covered earlier under the Heritage analysis and the actions in Alternatives 2 and 3 would not have measurable impacts on Tribal interest. The project is not located within a minority community and would not affect residents of

low or moderate income. This impact would not affect a specific subset of the American population at a disproportionately higher rate than others.

In addition, the effects of this project on the social context of these groups are within those described in the Forest Plan. The benefits and risks associated with implementation of the proposed action are provided to all members of the public. Therefore, the project would not pose disproportionately high or adverse effects to minority communities or to low income groups. As a result, no formal Civil Rights Impact or Environmental Justice Analysis was undertaken.

Consultation and Coordination

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GLOSSARY of ACRONYMS, ABBREVIATIONS, AND TERMS

Airshed – A geographical area that because of topography, meteorology and climate shares the same air.

Alternative - In an EIS, one of a number of possible options for responding to the purpose of and need for action.

Arterial Road - Roads comprising the basic access network for National Forest System administrative and management activities. These roads serve all resource to a substantial extent, and maintenance is not normally determined by the activities of any one element. They provide service to large lands areas and usually connect with public highways or other Forest arterial roads to form an integrated network of primary travel routes. Usually they are developed and operated for long-term land and resource management purposes and constant service.

BA - Biological Assessment

BAER – Burned Area Emergency Rehabilitation; measures taken to assist in rapid recovery of the burned lands and resources affected by a wildland forest fire.

Best Management Practices (BMPs) - Practices designed to prevent or reduce water pollution, including sedimentation.

BF - see Board Feet

BLM - Bureau of Land Management

BMP – see Best Management Practices

Board Foot (bf) - A unit of wood 12" x 12" x 1".

BTU – British Thermal Unit; the quantity of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

Canopy - In a forest, the branches from the uppermost layer of trees; in a shrub or grassland, the uppermost layer of shrubs; in a riparian area, the layers of vegetation that project over the stream.

Canopy Cover – The areas of the ground covered by a vertical projection of the canopy. Used to describe how open or dense a stand of trees is, often expressed in 10 percent increments.

CEF – Clearcut Equivalent Factor; the amount of area that can be described as a clearcut is defined in terms of the density of residual vegetation. Each particular land use areas is assigned a clearcut equivalent factor, which is multiplied by the area disturbed to arrive at an Equivalent Harvest Area (that area which when harvested under any of the various silvicultural regimes produces hydrological effects similar to one acre of clearcut).

CFR – Code of Federal Regulations.

Closed Road – Generally, local roads that are physically closed (signs, gates, and earthen berms) to public use.

Collector Road - Roads that serve smaller lands areas than a Forest arterial road, and usually connected to an arterial road or public highway. These roads collect traffic from local Forest roads and/or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs, as well as travel efficiency. These roads may be operated for either

constant or intermittent service, depending on land use and resource management objectives for the area.

Compaction - Packing together soil particles by exerting force at the soil surface and increasing soil density. Making soil hard and dense, decreasing its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

Connectivity - The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation (the opposite of fragmentation).

Cover - (1) Trees, shrubs, rocks, or other landscape features that allow an animal to partly or fully conceal itself. (2) The area of ground covered by plants, litter, and coarse fragments, including tree crowns and shrubs that are in direct contact with the ground.

Cultural Resources - The remains of sites, structures, or objects used by humans in the past. They may be historic, prehistoric, archaeological, or architectural in nature.

Cumulative Effects - Impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively major actions taking place over a period of time.

CWE – Cumulative Watershed Effects; substantial, adverse influences on water quality and biological resources that arise from the way watersheds function, and particularly from the ways that disturbances within a watershed can be transmitted and magnified within channels and riparian habitats downstream of disturbed areas.

DBH –Diameter of tree at Breast Height (4.5' height.)

Decommissioned (Road) - A road that is no longer needed and not planned to be used again. It has been closed and, generally, has been returned to production (example: a road that has been ripped/(tilled and planted with vegetation).

Density (stand) - The number of trees growing in a given area usually expressed in terms of trees per acre.

DecAID – Decayed Wood Advisor: an advisory tool to help land managers evaluate effects of forest conditions and existing or proposed management activities on organisms that use snags, down wood, and other wood decay elements.

Design Elements – measures taken to reduce the potential for negative impacts on a resource from a project activity.

Detrimental Soil Conditions – There are four categories describing detrimental soil conditions: compaction, displacement, puddling and severely burned soil or charring. Compaction is defined as an increase in soil bulk density of 20% or more from the undisturbed level for volcanic ash soils and 15% or more for residual soils. Displacement is often described as the removal or mixture of topsoil or humus from the A horizon. Puddling is the breakdown of soil structure under wet conditions. Severely burned soil or charring can be described as having the top layer of mineral soil greatly changed in color, usually to red, and the next one-half inch blackened from organic matter charring by heat conducted through the top layer.

Developed Recreation - Recreation that requires facilities that in turn result in concentrated use of an area; for example, a campground.

Direct Effects - Impacts on the environment that are caused by an action and occur at the same time and place.

Dispersed Recreation - Recreation that does not occur in a developed recreation sites; for example, hunting or backpacking.

Diversity - The distribution and abundance of different plant and animal communities and species within an area.

EA – Environmental Assessment

Ecosystem - A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

EHA - see Equivalent Harvest Area

EIS - see Environmental Impact Statement

Endangered Species - A plant or animal species listed under the Endangered Species Act that is in danger of extinction throughout all or a major portion of its range.

Endangered Species Act (ESA) - An act, passed by Congress in 1973 that directed all Federal departments and agencies to seek to conserve endangered and threatened species. Actions authorized, funded, or carried out by Federal departments and agencies should not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. The act also mandates conferencing with the appropriate agencies.

Endemic – Occurrence of insects or disease contained in population and location to a normal, balance level.

Environment - The combination of external physical, biological, social, and cultural conditions affecting the growth and development of organisms and the nature of an individual or community.

Environmental Consequences – Effects as a result of an action. Included are direct effects, which are caused by the action and occur at the same time and place; indirect effects, which are caused by the action and are later in time or further removed in distance but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and the related effects on air, water, and other natural systems, including ecosystems. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if, on balance, the agency believes the effects will be beneficial.

Equivalent Harvest Area (EHA) - That area which when harvested under any of the various silvicultural regimes produces hydrological effects similar to one acre of clearcut.

Evapotranspiration - The process by which water moves from the soil to the atmosphere by evaporation from the soil or transpiration through plants.

Feller-Buncher – Timber harvesting machinery that can saw a small diameter tree, delimb the log, and place the log on the landing.

Fire Intensity – Can be derived from the energy content of fuel, the mass of fuel consumed, and the rate of spread of the fire (energy release along a linear fire front). The length of flames of a fire can be related to its fire line intensity. Fire line intensity can be directly linked to some ecological effects such as crown or bole scorch.

Fire Regime - The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire. Fire regimes can be grouped into three severity regimes: Nonlethal, Mixed, and Stand Replacement. Nonlethal fires are of low to moderate intensity, creeping, surface fires that consume primarily understory grasses, forbs, and shrubs, and leave the overstory trees intact. Stand replacement fires are of high intensity and consume most of an existing stand. Mixed fires are of moderate intensity and consume the understory and some of the overstory.

Foreground – a term used in scenic management to describe the stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway.

Forest Plan (Land and Resource Management Plan) - A document that guides natural resource management and establishes standards and guidelines for a National Forest; required by the National Forest Management Act.

Forest Plan Amendment #2 (aka Regional Forester's Interim Direction Establishing Riparian, Ecosystem and Wildlife Standards for Timber Sales or Eastside Screens) - Originally signed in 1994 and amended in 1995. The objective of this direction was to provide an approach for maintaining future planning options concerning wildlife habitat associated with late and old structural stages, fish habitat, and old forest abundance. The direction was intentionally restrictive, reflecting a conservative interpretation of riparian, wildlife, and ecosystem needs for the short term. The direction applies to timber sales. The Interior Columbia Basin Ecosystem Management Project will supercede the Eastside Screens.

Fragmentation (habitat) - The breakup of a large land area (such as a forest) into smaller patches isolated by areas converted to a different land type (the opposite of connectivity).

FS - Forest Service

FSM – Forest Service Manual

Fuels – Includes living plants; dead, woody vegetative materials; and other vegetative materials capable of burning.

General Forest Management Area – see Management Area

Ground Cover - Perennial vegetation plus litter and coarse fragments (greater than 2 mm in size), including tree crowns and shrubs, that are in direct contact with the ground. Based on the erosion hazard class, **effective ground cover** is between 20% and 75% of ground covered the first year after management activities.

Group Selection - A silviculture system in which trees are removed in small groups.

Habitat - A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

Habitat Effectiveness Index (HEI) - An index of a Rocky Mountain elk habitat model. Habitat Effectiveness Index is a relative value of habitat conditions based on the potential of the habitat type to provide cover, the quality of existing cover, and the miles of roads open to vehicular traffic.

HEI - see Habitat Effectiveness Index

Heritage Resources – see Cultural Resources

IDT - Interdisciplinary Team

Inactivated (Road) - A road that is managed in a stored or closed category for long-term intermittent use. Generally, a traffic service level D single purpose type road that remains open to motorized off-highway vehicles. An inactivated road can be hydrologically stabilized or hydrologically closed.

Indirect Effects - Impacts on the environment that are caused by an action and are later in time or farther removed in distance.

INFISH - Interim Inland Native Fish Strategy for the Intermountain, Northern, and Pacific Northwest Regions (Forest Service). A strategy intended to provide interim direction to protect habitat and populations of resident fish outside of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada. The Decision Notice/Finding of No Significant Impact for this strategy was signed July 28, 1995.

Instream Structures – Boulders, logs, or other artificially placed materials that are used to enhance or improve existing fish habitat by altering stream velocity and depth or to provide physical cover.

Interdisciplinary Team (IDT) - A team of people that collectively represent several disciplines and whose duty it is to coordinate and integrate the planning process.

Intermittent Stream - A stream that flows only at certain times of the year when it receives water from other streams or from surface sources such as melting snow.

Irretrievable - A category of impacts that applies to losses of production or commitment of renewable resources. For example, while a linear piece of land is being used as a road, some or all of the timber production there is "irretrievably lost." If the road was rehabilitated after use and soil compaction was reduced, timber production could resume; therefore, the loss of timber production during the time the road was in use is irretrievable but not irreversible, because it is possible for timber production to resume if the piece of land is no longer used as a road.

Irreversible - A category of impacts that applies to non-renewable resources, such as minerals and archaeological sites. Losses of these resources cannot be reversed. Irreversible effects can also refer to effects of actions on resources that can be renewed only after a very long period of time, such as the loss of soil productivity.

Issue - A matter of controversy, dispute, or general concern over resource management activities or land uses. To be considered a "major " or "key" issue, it must be well defined, relevant to the proposed action, and within the ability of the agency to address through alternative management strategies.

Landtype – An inventory map unit with relatively uniform potential for a defined set of land uses. Properties of soils, landform, natural vegetation, and bedrock are commonly components of landtype delineation used to evaluate potentials and limitations for land use.

Late and Old Structure (LOS*)* - Late and old structure forested stands. See Late Successional and Old Structured.

LAU - Lynx Analysis Unit

LEB – Log erosion barrier.

Listed Species - A wildlife or plant species listed under the authorization of the Endangered Species Act as threatened or endangered.

Listed (Streams*)* – Streams listed by Oregon Department of Environmental Quality (ODEQ) as water quality limited due to stream temperatures or habitat modification.

Local Road - Local roads are usually one-lane roads constructed to serve a dominant use or resource. Local roads do not access large land areas since they are more site-specific than arterial and collector roads.

LOS - see Late/Old Structure

LRMP - Land & Resource Management Plan (see Forest Plan)

LWM - Large Woody Material

MA - Management Area; a unit of land allocated to emphasize a particular resource, based on the capability of the area.

Management Direction - A statement of goals and objectives, management prescriptions, and associated standards and guidelines for attaining them.

Management Indicator Species (MIS*)* - Vertebrate species whose population changes are believed to best serve as an index of a biological community's response to the effects of land management activities or are important for fishing, hunting and trapping.

MBF - Thousand Board Feet

Middlestory – Middle canopy layer of trees.

MIS – see Management Indicator Species

Mitigation - Measures designed to counteract environmental impacts or to make impacts less severe.

MSDS – Material Safety Data Sheet.

National Environmental Policy Act (NEPA) - An act, passed by Congress in 1969 that declared a national policy to encourage productive harmony between humans and their environment. This act requires the preparation of environmental impact statements for Federal actions that are determined to be of major significance (see 40 CFR [Code of Federal Regulations] 1500-1508 for implementing regulations. See also FSH [Forest Service Handbook] 1909.15, the FS Environmental Policy and Procedures Handbook.)

NEPA - see National Environment Policy Act

NLAA - Not Likely to Adversely Affect

NMFS - National Marine Service

No Action Alternative - The most likely condition expected to exist in the future if current management direction were to continue unchanged.

Non-forest Land – Lands that have never had or that are incapable of having 10% or more of the area occupied by forest trees, or lands previously having such cover and currently developed for nonforested use.

ODEQ - Oregon Department of Environment Quality

ODFW - Oregon Department of Fish & Wildlife

Old Structure - A forest stand with moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees, high incidence of large trees, some with broken tops and other indications of old decaying wood (decadence), numerous large snags; and heavy accumulations of downed wood. For ponderosa pine stands, large diameter trees with

incidences of snags and old decaying wood may indicate old structure. Canopy densities may actually be low with fewer trees per acre present than other plant associations.

OSHA - Oregon Occupational Safety & Health Association

Overstory - The upper canopy layer of trees.

PACFISH – Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (commonly referred to as PACFISH).

PBA - Programmatic Biological Assessment

PDC - Project Design Criteria

Perennial - A plant that lives for three or more years.

Perennial Stream - A stream that flows water year round.

PFA - Post Fledgling Area

Plant Associations - Climax plant community type.

Plant Association Group (PAG) - A group of plant associations that share similar productivities, disturbance regimes, and responses to disturbance. Eight major plant association groups have been described on the Ochoco National Forest.

Plant Communities - A homogeneous unit in respect to the number and relationship of plants in tree, shrub, and ground cover strata.

Prescribed Fire – A wildland fire burning under specified conditions that will accomplish certain planned objectives. The fire may result from either planned or natural ignitions. The Regional Forester must approve proposals for use of natural ignitions for this purpose.

Proposed Action - A proposal made by the Forest Service to authorize, recommend, or implement an action on National Forest System lands to meet a specific purpose and need.

Rager Green Dot Road Closure – a wildlife management tool, used on the Paulina Ranger District (Rager Ranger Station), where certain forest roads and the adjacent area within 300 feet of those roads are closed to public vehicular traffic during periods of restrictions. Closure begins three days prior to General Deer Season.

RER - Relative Erosion Rate

RHCA - see Riparian Habitat Conservation Area

Riparian Area - An area with distinctive soil and vegetation between a stream or other body of water and the adjacent upland; includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation.

Riparian Habitat Conservation Area (RHCA*) -* A portion of a watershed where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCA include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems by (1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading the stream, and (4) protecting water quality.

RMO - Riparian Management Objectives

Scoping - The early stages of preparation of an environmental assessment or environmental impact statement used to solicit public opinion, receive comments and suggestions, and determine the issues to be considered in the development and analysis of a range of alternatives. Scoping may involve public meetings, telephone conversations, mailings, letters, and other contacts.

SDI - Stand Density Index

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation – The action or process of forming or depositing sediments.

Sensitive Species - Species identified by a Regional Forester for which population viability is a concern because (a) of substantial current or predicted downward trends in population numbers or density, or, (b) of substantial current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Seral Stage – A plant or animal community that is transitional in stage of succession, being either short- or long-term. If left alone, the seral stage will pass and another plant or animal community will replace it.

Short-Term Effects – For timber management planning, those effects which will not be substantial beyond the RPA planning horizon of 50 years. For DEQ water quality, short-term effects are defined as two days or less. Generally, short-term effects are within the planning period.

SHPO - State Historic Preservation Officer.

Silviculture - The practice of manipulating the establishment, composition, structure, growth, and rate of succession of forests to accomplish specific objectives.

Species - A population or series of populations of organisms that can interbreed and reproduce freely with each other but not with members of other species.

Stand - A group of trees in a specific area that is sufficiently alike in composition, age, arrangement, and condition to be distinguishable from the forest in adjoining areas.

Stream Class - A classification system for streams according to their beneficial uses. **Class I** are perennial or intermittent streams containing one or more of the following characteristics: (1) are the direct source of water for domestic use; (2) are used by large numbers of fish for spawning, rearing, or migration; and/or (3) contain enough flow to have a major influence on water quality of a Class I stream. **Class II** are perennial or intermittent streams containing one or more of the following characteristics: (1) are used by moderate numbers of fish for spawning, rearing, or migration; and/or (2) flow enough water to have a moderate influence on downstream quality of a class I or II stream. **Class III** are all other perennial streams not meeting Class I or II definitions. **Class IV** are all other intermittent streams not meeting Class I, II, or III definitions.

Subwatershed - An area mostly bounded by ridges or other similar topographic features contributing water, organic matter, dissolved nutrients, and sediments to a lake or stream.

Succession - A series of dynamic changes by which one group of organisms succeeds another through stages leading to potential natural community or climax. An example is the development or series of plant communities (called seral stages) following a major disturbance.

Threatened Species - Species listed under the Endangered Species Act that are likely to become endangered within the foreseeable future throughout all or a major portion of their range.

TMDL - Total Maximum Daily Load

TSP - Total Suspended Particulates

Understory – May include grass, forbs, shrubs, small trees (such as seedlings and saplings), and other plants found beneath the overstory tree canopy.

Uneven-aged Silviculture System - Method of forest management in which trees of different species in a given stand are maintained at many ages and sizes to permit continuous natural regeneration. Selective cutting is one example of an uneven-aged management method.

USDA - United States Department of Agriculture.

USDI - United States Department of Interior.

USFWS - United States Fish & Wildlife Service

VEMG - see Viable Ecosystem Management Guide

Viable Ecosystems Management Guide - A system to classify vegetation on a landscape basis. This system compares existing vegetation with site potential. It focuses on relationships between combinations of vegetation structure and species composition, and habitat requirements for animals, insects, and plants. The Ochoco National Forest Viable Ecosystem Quality Action Team devised this guide.

The Viable Ecosystems Management Guide describes a seral/structural matrix for characterizing forest vegetation by plant association groups (PAG). Each plant association group is further characterized by seral and structural stages. There are three seral stages: E (early), M (middle), and L (late). There are five structural stages: 1 (grass/forb/shrub), 2 (seedling and sapling, trees less than 4.9 inches dbh), 3 (pole, trees between 5 and 8.9 inches dbh), 4 (small, trees between 9 - 20.9 inches dbh), and 5 (medium and large, trees greater than 21 inches dbh). The seral/structural classification is based on the dominant vegetative features on the site.

WEPP – Water Erosion Prediction Project; a model to estimate potential soil erosion and sediment transport.

W/D - Width to Depth Ratio

Xeric – Of, characterized by, or adapted to an extremely dry habitat.

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APPENDIX A.

ISSUES IDENTIFIED DURING THE

SCOPING PROCESS

ISSUES IDENTIFIED DURING THE SCOPING PROCESS

This document groups, by issue, the comments we received during the scoping process from the following sources:

December 16, 2002	League of Wilderness Defenders, Blue Mountain Biodiversity Project.
December 4, 2002	Field trip for the public to the Murray Fire Area.
December 16, 2002	Oregon Natural Resources Council, Western Field Office.
December 17, 2002	D. R. Johnson Lumber Company, Riddle, Oregon.
	Beschta Report, Oregon State University

Using the attached copies of the original letters, field notes, and report, one can match the numbered comments in this document with their source.

Issue: Soil Productivity – Key Issue

League of Wilderness Defenders, Blue Mountain Biodiversity Project:
1-10, 1-11, 1-17
Field trip for the public to the Murray Fire Area:
2-15, 2-27
Oregon Natural Resources Council, Western Field Office:
3-3, 3-5, 3-7, 3-8, 3-9, 3-11, 3-12, 3-13, 3-14, 3-15, 3-16
D. R. Johnson Lumber Company, Riddle, Oregon:
4-6
Beschta Report, Oregon State University:
B-1, B-3, B-4, B-5, B-6, B-7, B-10

Issue: Hydrology/Water Quality – Key Issue

League of Wilderness Defenders, Blue Mountain Biodiversity Project:
1-9
Field trip for the public to the Murray Fire Area:
2-3
Oregon Natural Resources Council, Western Field Office:
3-2, 3-6, 3-21
D. R. Johnson Lumber Company, Riddle, Oregon:
No comments received on this issue
Beschta Report, Oregon State University:
B-5, B-6, B-7

Issue: Social Economics – Key Issue

League of Wilderness Defenders, Blue Mountain Biodiversity Project:
1-23

Field trip for the public to the Murray Fire Area:
2-1, 2-2, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-12, 2-13, 2-16, 2-19, 2-20, 2-21, 2-22, 2-23, 2-24, 2-25, 2-26
Oregon Natural Resources Council, Western Field Office:
No comments received on this issue

D. R. Johnson Lumber Company, Riddle, Oregon:
4-1, 4-4, 4-5
Beschta Report, Oregon State University:
No references to this issue

Issue: Reburn Potential

League of Wilderness Defenders, Blue Mountain Biodiversity Project:
No comments received on this issue
Field trip for the public to the Murray Fire Area:
2-18
Oregon Natural Resources Council, Western Field Office:
No comments received on this issue
D. R. Johnson Lumber Company, Riddle, Oregon:
4-2
Beschta Report, Oregon State University:
No references to this issue

Issue: Wildlife Habitat

League of Wilderness Defenders, Blue Mountain Biodiversity Project:
1-7, 1-14, 1-20
Field trip for the public to the Murray Fire Area:
2-12, 2-19, 2-20
Oregon Natural Resources Council, Western Field Office:
3-6, 3-23
D. R. Johnson Lumber Company, Riddle, Oregon:
No comments received on this issue
Beschta Report, Oregon State University:
B-9

Issue: Reforestation

League of Wilderness Defenders, Blue Mountain Biodiversity Project:
1-21, 1-22
Field trip for the public to the Murray Fire Area:
No comments received on this issue
Oregon Natural Resources Council, Western Field Office:
No comments received on this issue
D. R. Johnson Lumber Company, Riddle, Oregon:
No comments received on this issue
Beschta Report, Oregon State University:
B-4, B-10

Scoping Comments Addressed Elsewhere:

In Alternative Design: 1-24, 3-10, 3-22
Through Mitigation: B-6

ISSUES AND COMMENTS THAT WILL NOT BE ADDRESSED FURTHER:

League of Wilderness Defenders, Blue Mountain Biodiversity Project:

1-1,1-2 There are no Roadless Areas within or adjacent to the Murray Fire Salvage Project.

1-3 A bibliography for the Murray Flat Salvage EA is standard procedure.
1-4 Documenting the author's qualifications is standard procedure.
1-5,1-6,1-15,1-19, 1-8 Existing Condition write-ups of the Murray Fire Area (silviculture/fire/wildlife, etc) are standard procedure.
1-14 The 747Fire burned outside the Sunflower Creek Watershed. The geographical extent of this issue may affect some resources (ex: wildlife) in which case it will be addressed as appropriate.
1-18 A new Purpose and Need for Murray Flat Salvage proposed action would not be developed. The Purpose and Need is developed through the ID Team process that evaluates the existing conditions, desired future conditions, Forest Plan Standards and Guidelines, and management area direction.
1-25 Murray Fire Salvage is not considered a "Restoration, Forest Health, or Recovery" project.
1-12,1-13,1-16,1-20,1-4 Cumulative Effects (including 303(d) listed streams) analysis is standard procedure, and will be included in the Murray Salvage EA

Public Field Trip:

2-2 There will be no benefit to the RMO to salvage within RHCA's. This is policy (PACFISH) direction.
2-10 Rocky areas deleted are not a compaction issue. These rocky areas are unsuitable lands.
2-14 Regional direction, 20% compaction is a LRMP standard and guideline.
2-11, 2-28, 2-29 It was District Ranger direction to complete a fire salvage EA. We do not currently have direction to do CE's for fire salvage yet.

Oregon Natural Resources Council, Western Field Office:

3-18 There are no Roadless Areas within or adjacent to the Murray Fire Salvage Project.

3-20 Surveys – documenting existing surveys for each resource is standard procedure. Manual direction for salvage sales (FSM 2435.5 WO Amendment 2400-2002-3) is to use existing survey information for effects analysis for sensitive species and cultural resources. T and E species can be further surveyed, as the Ranger deems appropriate.

3-6 Cumulative Effects (including 303(d) listed streams) analysis is standard procedure and will be included in the Murray Salvage EA
3-17 A Roads Analysis is not required since the project does not require road building.
3-19 Old Growth – the project does not encompass designated old growth, nor undesignated old growth.

D. R. Johnson Lumber Company, Riddle, Oregon:

No comments that will not be addressed.

Beschta Report, Oregon State University:

B-6 There will be no benefit to the RMO to salvage within RHCA. This is policy (PACFISH) direction.

B-8 It was District Ranger direction to complete a fire salvage EA. No direction for CE's yet.

B-6 There are no Roadless Areas within or adjacent to the Murray Fire Salvage Project.

B-2, B-4 Cumulative Effects (including 303(d) listed streams) analysis is standard procedure, and will be included in the Murray Salvage EA