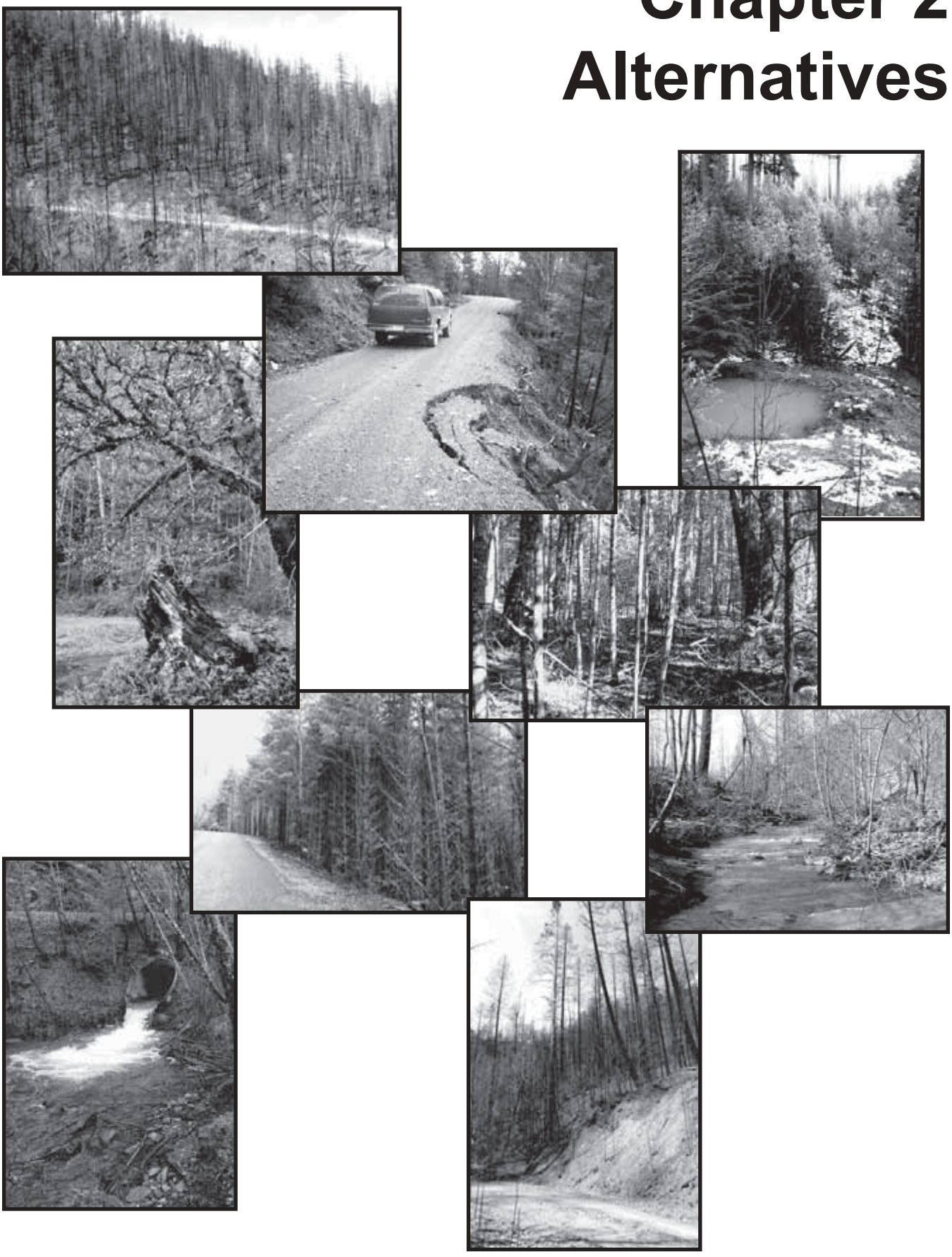
Chapter 2
Alternatives



Changes between the Draft EIS and Final EIS

The following changes were made to Chapter 2 between the Draft EIS and Final EIS.
Minor corrections, explanations, and edits are not included on this list.

- Figure 2.3-2 has been added to show the approximate number of fire-killed trees salvaged or retained by size class, as suggested by commenters.
- The "remaining area salvage" description in Alternative G has been changed to show that actual retained snags will be clumped. This reduced total salvageable acres.
- The description of proposed wildlife-related snag research has been updated in Alternative G.
- Salvage project design features in Section 2.3.1.3 have been reorganized for clarity, as suggested by commenters.
- Acres to be treated in the vegetation restoration projects in Section 2.3.2.2 for Late-Successional Forest Habitat Restoration, Pine Habitat Restoration, and Riparian Reserve thinning has been updated for Alternatives C, D, and G.
- Map 2-5 has been corrected. 'Wildland Urban Interface' areas on Map 2-5 in the DEIS should have been labeled 'Communities at Risk.' Map 2-5 in the FEIS displays the actual 'Wildland Urban Interface' areas.
- In Alternative G, tractor harvest acres have increased, while helicopter and cable system acres have decreased.
- Acreage figures and other numbers in alternative descriptions and Tables 2-1, 2-2, and 2-3 have been updated to reflect most current knowledge.
- Table 2-2 has been updated in the Insect Outbreak section to reflect the baseline used, which is Alternative A, No-Action.
- Table 2-4 "Stand Replacement Trends and Consequences" has been added to project future conditions at various snapshots in time for the stand-replacement fire areas, as suggested by commenters.
- Table 2-5 "Restoration Trends and Consequences" has been added, as suggested by commenters. It is an expansion of Table K-2.
- The following work has been completed and dropped from this EIS. This work was analyzed in the Timbered Rock Fire Emergency Stabilization/Rehabilitation Plan (ESRP) EA-OR-110-03-08.
  - Planting has been completed on approximately 1,000 acres within the fire
  - Removal of 1 fish culvert has been completed

2.0 Alternatives

- Seven alternatives were developed to respond to issues identified in Chapter 1.
- Alternatives address salvage within the fire perimeter and restoration projects throughout the LSR.
- A brief description of proposed salvage and restoration projects is included.
- Alternative G is the BLM's Preferred Alternative.
- A description of how alternatives were developed and the range of alternatives is included.
- Table 2-1 compares the alternatives in table format.
- Table 2-2 summarizes the effects of the alternatives.
- Table 2-3 summarizes cumulative effects.
- Table 2-4 projects the anticipated trends and consequences in stand-replacement areas.
- Table 2-5 projects the anticipated trends and consequences of the proposed restoration projects.

2.1 Introduction

Seven alternatives were developed to provide different responses to the issues identified in Chapter 1. A No Action Alternative (Alternative A) was included. Alternative G is identified as the BLM's Preferred Alternative.

The action alternatives contain two major categories of proposed projects:

1. Salvage within the fire perimeter (Alternatives C-G).
2. Restoration projects located throughout the Elk Creek Watershed (Alternatives B-G).

Maps illustrating the proposals by alternative are attached. Table 2-1 documents the salvage and restoration proposals by alternative in a comparative format. Table 2-2 is a comparison of the major effects that would occur if any of the alternatives were implemented. Table 2-3 summarizes the cumulative effects analyses presented in Chapter 3. Table 2-4 describes anticipated trends and consequences due to fire effects in salvaged and unsalvaged areas at 15, 50, and 80 years int he future. Table 2-5 describes anticipated trends and consequences of the restoration projects at 5 and 50 years in the future.

2.2 Alternative Design

The alternatives presented in this Final EIS were developed using an interdisciplinary process including managerial input.

Questions revolved around four major issues:

1. Should the BLM propose economic recovery of fire-killed trees (salvage) within the area affected by the Timbered Rock Fire?
2. If so, what level of salvage would be appropriate considering cumulative effects and land use allocations within the watershed?
3. If salvage is to be analyzed, why not evaluate restoration projects throughout the LSR?
4. What level of restoration is appropriate?

Preliminary review of the NFP, RMP, WA, and LSRA determined salvage is consistent with management direction or recommendations found in those documents. Subsequently, a decision was made to proceed with an analysis of salvage and to include late-successional forest restoration recommendations contained in the WA and LSRA. Cumulative effects would be analyzed in the environmental analysis.

A review of scientific literature, court decisions, management direction/recommendations, discussions among team members, and comments from the public revealed that levels of snags and coarse woody debris (CWD) were critical issues regarding salvage and management of LSRs. The interdisciplinary team decided to formulate salvage alternatives around these concerns which also had a direct effect on recoverability of fire-killed trees. Projects designed to restore late-successional forest conditions would be developed from recommendations in the previously prepared WA or LSRA or developed during preparation of this EIS.

2.3 Proposed Project Descriptions

Project Proposals

Salvage

- Area Salvage
  - Salvage Research Proposal
- Roadside Salvage

Restoration

- Fish Habitat Improvement
  - Culvert Replacement
  - Fish Structures
- Vegetation Treatments
  - Late-Successional Habitat Restoration
  - Pine Habitat Restoration
  - Riparian Habitat Restoration
  - Oak Woodland and Meadow Restoration
- Reforestation
  - Reforestation Research Proposal
- Fuels Treatments
  - Fuel Management Zones
  - Fuel Hazard Reduction
- Wildlife Projects
  - Eagle Habitat Improvement
  - Denning Habitat Project
- Road Projects
  - Road Reconstruction
  - Road Stream-crossing Upgrades
  - Road Maintenance
  - Road Decommissioning
  - Seasonal Road Closures
- Pump Chance Reconstruction
- Rock Quarry Closure and Rehabilitation

Following is a brief description of proposed projects. Salvage is described in Appendix D. Restoration projects are described in Appendix E. Project locations are shown on project maps and on alternative maps.

2.3.1 Salvage Proposals

Two types of salvage, area and roadside, are discussed. Alternatives A and B propose no salvage. Salvage within Alternatives C - G would obtain some level of economic recovery. Each salvage alternative was designed using specific guidance relating to post-fire salvage and/or Late-Successional Reserve guidelines. Description of this guidance is included in the alternative descriptions. Research could be considered within each of the salvage alternatives. Alternative G includes a research proposal designed specifically to study the effects of various snag retention levels on wildlife species.

Acres of salvage vary by alternative and an array of snag and coarse woody debris (CWD) levels are considered. Harvest methods vary within each alternative. Treated acres and harvest method acres are provided within each alternative description.

The salvage proposal would not include harvesting of green trees but an occasional green tree may be cut to facilitate logging. These trees may be needed for guy lines for cable yarding systems, yarding corridors, landings, and new temporary road construction. These trees would be harvested. Any green trees cut in Riparian Reserves or within one-quarter mile of active owl sites would be left for CWD.

It is anticipated most fire-killed trees in 8-16" DBH size classes would deteriorate before any salvage would occur and would no longer have commercial value. These trees would provide additional snags and CWD.

Salvage of roadside hazard trees is included in all salvage alternatives (Alternatives C–G). The goal is to recover the economic value of trees that have been identified as hazards to users within the fire area. Regardless of the alternative, trees identified as hazards would be felled.

2.3.1.1 Area Salvage

Table 2.3-1 shows how the fire-killed trees are distributed across the Timbered Rock Fire area. Scattered areas within the fire perimeter were unburned.

Area salvage is proposed on BLM-administered lands within

Table 2.3-1. Acres of Fire-killed Trees

Acres of stand-replacement in riparian	656
Acres of stand-replacement in areas <10 acres in size	551
Acres of all other stand replacement	1,379
Total acres of stand replacement	2,586
Low severity burn areas; >40% canopy cover	7,206
Total acres of fire-killed trees	9,792

the Timbered Rock Fire perimeter where trees were killed by the fire. Only trees considered dead would be salvaged. As used in this EIS, a fire-killed tree is defined as “a tree with no apparent sign of green foliage.” The location and amount of salvage being considered varies by alternative. Harvest systems in all alternatives would include tractor, cable, and helicopter logging.

In Alternatives A and B, no salvage would occur. Alternatives C, D, and G focus on high and moderate burn

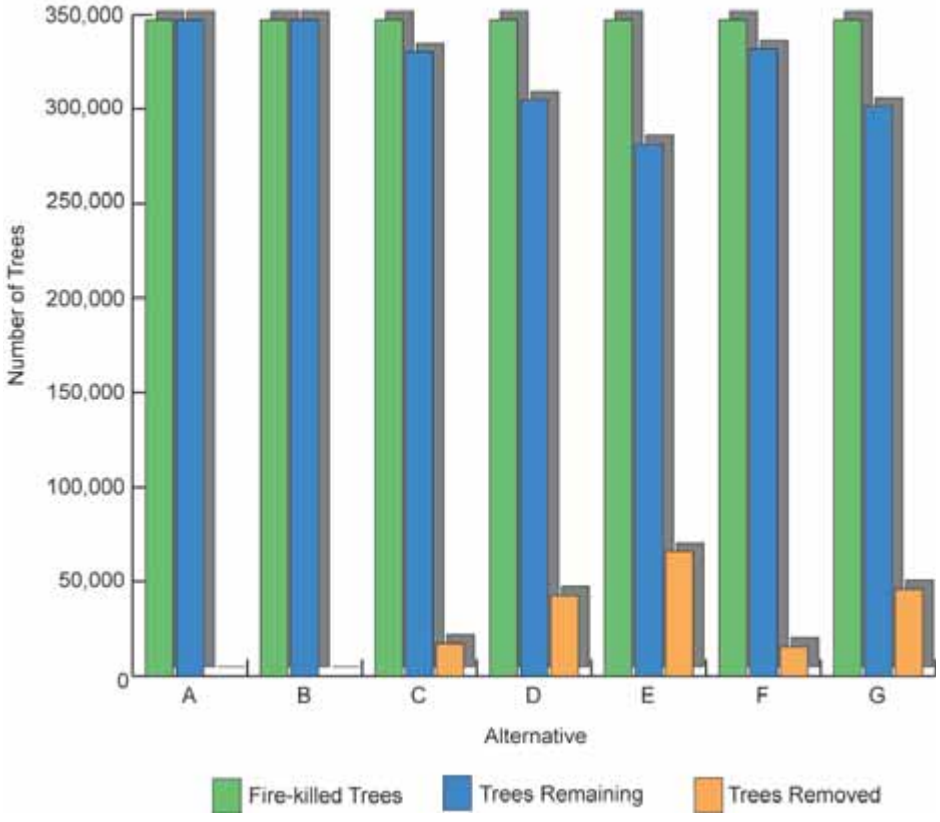
severity areas greater than 10 acres and less than 40 percent canopy cover where the fire resulted in a stand-replacement event. Alternative C is based on guidelines from the LSRA including snag and CWD retention recommendations. Alternative D follows the guidelines from the NFP (USDA and USDI 1994, C-14). Snag and CWD retention levels in this alternative were based on the DecAID Advisor developed by the LSR Working Group (see Appendix D). Alternative G includes a salvage research proposal and area salvage proposal. Snag and CWD retention levels in the research units would meet levels recommended in the research proposal. Snag and CWD retention levels in the area salvage would meet levels recommended in a variety of local and regional sources.

Alternative E considers high, moderate, low, and very low burn severity areas for salvage. Snag retention levels within the high and moderate burn severity areas for this alternative would be 6-14 snags per acre, based on a study of the *Effects of Stand-Replacement Fire and Salvage Logging on a Cavity-Nesting Bird Community in Eastern Cascades, Washington* (Haggard and Gaines 2001). The study found the highest diversity in cavity nesting species and highest number of nests in areas where snag densities ranged from 6-14 snags per acre. Snag retention within the low and very low burn severity areas would be four snags per acre. The CWD level in this alternative would be 120 linear feet per acre, with a minimum size of 16" by 16'.

In Alternative F, the emphasis is on implementing guidance contained in *Recommendations for Ecologically Sound Post- Fire Salvage Management and Other Post-Fire Treatments on Federal Lands in the West* (Beschta, et al. 1995). Emphasis would be placed on recommendations to avoid severely burned areas, erosive sites, fragile soils, riparian areas, steep slopes, or sites where accelerated erosion is possible. Other recommendations from this paper were considered but were not included (see Section 2.5.1.3 - Alternatives Considered but Eliminated from Detailed Analysis). Existing snags and CWD levels would be retained on all these areas. Salvage would occur in patches of fire-killed trees between 3 and 10 acres in size. Within each of these patches, a minimum of two acres would be reserved from salvage.

Alternative G includes a design to investigate the influences of post-fire salvage and salvage intensity on wildlife response. This alternative was designed in collaboration with Oregon State University scientists and the Cooperative Forest Ecosystem Research (CFER) group. For this study, 12, 30-acre or greater units were selected. The objective for this study is to determine the relative influence of salvage on wildlife species.

Figure 2.3-1. Distribution of All Fire-killed Trees



Three treatments will be implemented in the study:

1. Control
   No salvage activity would occur.
2. Moderate Salvage Prescription
   No salvage would occur in 30 percent of the site. In the remaining 70 percent of the site, 6 trees per acre greater than 20" DBH would be retained on all sites. The unsalvaged area would include riparian areas, if present. Retained snags would be dispersed throughout the salvaged area
3. Heavy Salvage Prescription
   The entire site would be salvaged. Six trees per acre greater than 20" DBH would be retained throughout the site. Retained snags would be dispersed throughout the salvaged area.

In the salvaged research units, all management activities, such as reforestation, would be identical across treatments.

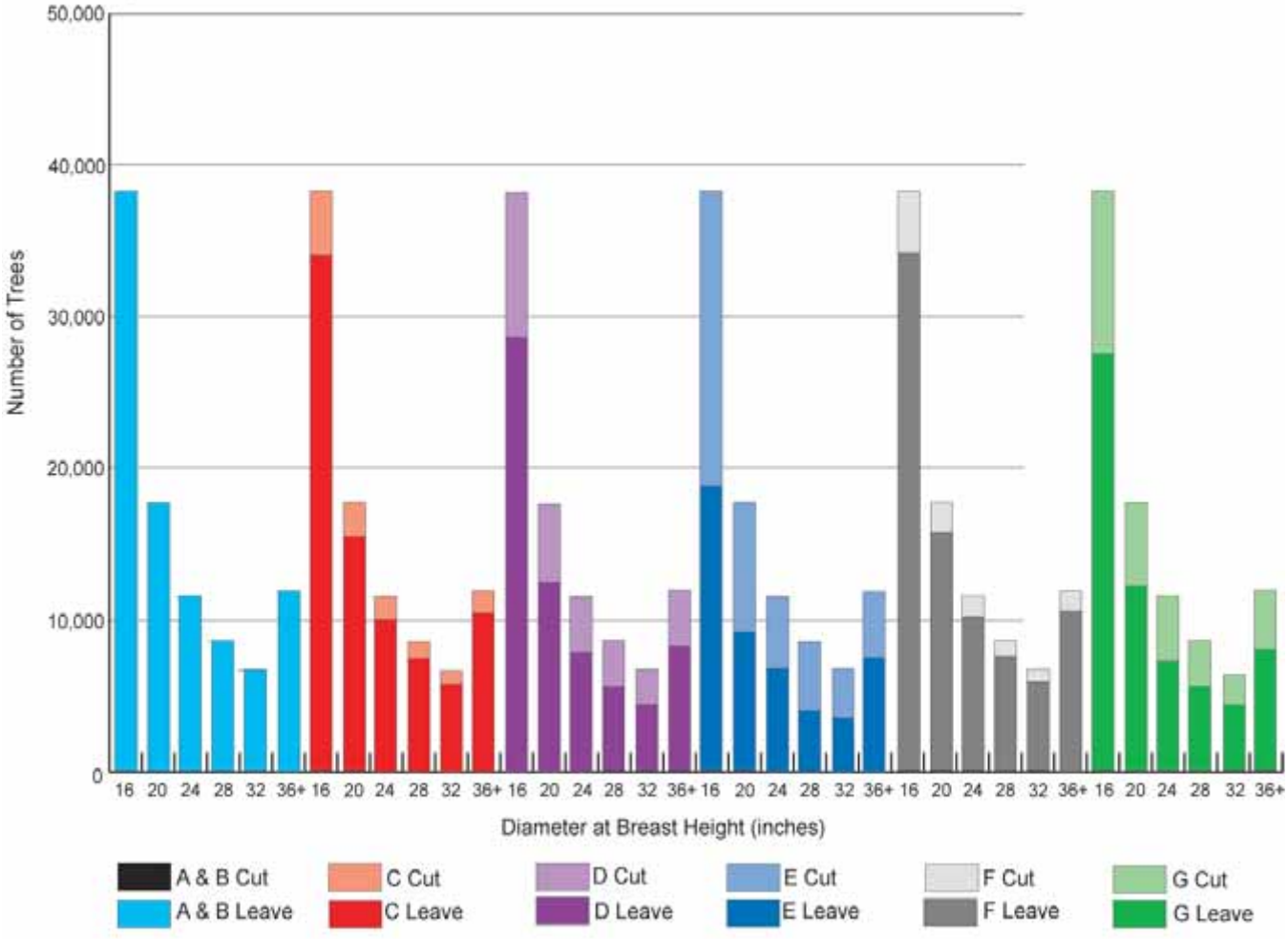
These research proposals are further described in the project descriptions with the complete study plans found in Appendix G.

In areas other than the salvage research units, salvage areas could occur in high and moderate severity areas greater than 10 acres. Snag retention in these units would follow recommendations from a number of local and regional references (see Appendix D). Salvage could occur in areas less than 10 acres in size for operation purposes and where adjacent to FMZs. Snags would be retained in reserved areas outside of cut patches.

Figure 2.3-1 illustrates the number of fire-killed trees which would be retained and/or salvaged by alternative.

Figure 2.3-2 illustrates the number of fire-killed trees by diameter which would be retained and/or salvaged by alternative.

Figure 2.3-2. Distribution of Salvaged and Retained Fire-Killed Trees by Alternative and Diameter Class



Trees 8" and 12" DBH not included in graph. They are not expected to be salvaged because of merchantability.

This graph is intended for comparison purposes only. The numbers are approximations based on stand exam information.

Table 2.3-2. Acres of Available Roadside Salvage by Burn Severity

Burn Severity	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G
High/Moderate	127	136	54	233	74
Low/Very Low	951	950	482	949	881
Total	1,078	1,086	536	1,182	955

Appendix D contains visual depictions of how one proposed harvest unit (located in T32S, R1E, Section 29) would look after salvage in each alternative. These visual depictions were generated using the Stand Visualization System (SVS), a computer-based program. Figure D-2 in Appendix D illustrates what the stand would look like in Alternatives A, B, and F where no salvage would occur. Figures D-3, D-4, and D-5 show the same stand following salvage guidelines under Alternatives C, D, and E respectively. Salvage in the proposed harvest unit under Alternative G is shown in a series of three figures. Figure D-6 illustrates how the unit would look following salvage based on guidelines from an intensive salvage research unit, Figure D-7 is based on moderate salvage research unit guidelines, and Figure D-8 shows remaining area salvage.

2.3.1.2 Salvage of Roadside Hazards

Table 2.3-2 shows the approximate acres of roadside salvage by burn severity within each alternative.

Roadside salvage along BLM-administered roads is proposed in Alternatives C-G. The intent is to capture the economic value of the fire-killed trees which are or could be a hazard to road users, including the public, government employees, private landowners, and contractors. This would include salvaging of hazard trees previously felled along the Pacific Power powerline in T32S, R1E, Section 5. Trees felled within riparian areas or needed in log piles for wildlife habitat would be excluded from salvage.

The area considered for roadside salvage is generally a 200' strip above and below existing open roads or roads needed on a temporary basis for post-fire operations. Not all trees within this 200' strip are hazards and therefore would not be salvaged; only those trees which pose a threat or potential threat would be harvested. Guidance from the Occupational Safety and Health Administration (OSHA) would be considered to determine hazard trees. Roadside hazards would vary by location along the road and burn severity. Areas below the road would have fewer hazard trees than areas above the road. Stand replacement areas (generally high and moderate severity) would have higher concentrations of hazard trees. Areas of low and very low severity would have fewer hazard trees and would be isolated trees scattered along the roads.

The BLM would only identify immediate hazard trees along roads through riparian areas or in owl activity centers with suitable habitat. Hazard trees identified in these areas would be cut. Only the tree or portion of tree which falls within the road prism, from the top of the road cut to the top of the fill, would be salvaged.

2.3.1.3 Salvage Project Design Features

The following Project Design Features (PDF) are included in the design of salvage projects in Alternatives C-G. These PDFs are a compilation of the Best Management Practices identified in the Medford District RMP and resource protection measures identified by the EIS ID Team. The PDFs would serve as a basis for resource protection in the implementation of any salvage actions. They will be considered in the analysis of the impacts of salvage in the Chapter 3. Project Design Features for restoration projection are included in each project description.

1. The total number of skid trails would be minimized by designating skid trails with an average of 150' spacing. Avoid creating new skid trails and utilize existing trails where feasible in order to minimize ground disturbance, especially in thinning and selective cut units where no ripping is proposed. Design skid trails to minimize disturbance.
2. Skid trails would be located to minimize disturbance to coarse woody debris (CWD). Where skid roads encounter large CWD, a section of the CWD would be bucked out for equipment access. The remainder of the CWD would be left in place and not disturbed.
3. Tractor and/or mechanical operations would be restricted to slopes generally less than 35 percent.
4. Skid trails would be water-barred during the same operating season as constructed.
5. Ripping of skid trails would occur in all tractor yarded salvage units during the same operational season they were constructed. No ripping would occur within 100 feet of any existing green trees greater than 7" DBH.
6. All tractor yarding, soil ripping, and excavator piling operations would be limited to the dry season, generally from May 15 to October 15, and/or when soil moisture is less than 25 percent.
7. Areas identified for ripping (skid roads, landings, decommissioned roads) would be ripped to a depth of 18" utilizing a sub-soiler or winged toothed rippers.

8. Cable yarding would require one-end suspension, full suspension over streams, and no streambank disturbance.
9. Hand water bar corridors in roadside salvage areas above roads where drainage would lead directly to streams.
10. Water bar all yarding corridors within Riparian Reserves.
11. Water bar yarding corridors where needed, as determined by the contract administrator.
12. Along the ridgetops in the FMZs, where large diameter snags are present and salvage logging is proposed to reduce risk, retain 2 stumps per acre >30" DBH and 30-36" high to provide habitat for bats on ridges, where it can be safely accomplished.
13. Activity slash would be lopped and scattered, piled, or burned as necessary to reduce or eliminate additional fuel loading. Piled slash would be burned during the fall and winter to reduce impacts on air quality. All burning would follow the guidelines of the Oregon Smoke Management Plan.
14. Harvest would be restricted from March 1 to September 30 within ¼ mile of known spotted owl sites (within ½ mile for helicopter operations). This restriction may be waived if non-nesting is determined. If any new owls were discovered in harvest units following the sale date, activities would be suspended until mitigation could be determined.
15. Harvest would be restricted from March 1 to September 30 within ¼ mile of known spotted owl sites (within ½ mile for helicopter operations) in any unsurveyed green stand determined to be suitable as northern spotted owl nesting habitat. This restriction may be waived if non-nesting is determined.
16. Activities would be restricted from February 1 to August 1 within ½ mile of suitable, unsurveyed peregrine falcon nest cliffs (within 1 mile for helicopter operations).
17. Activities would be restricted from March 1 to August 1 within ¼ mile of newly discovered great gray owl nests or within unsurveyed, suitable great gray owl habitat.
18. Surveys would be conducted prior to any activity that could alter habitat for Survey and Manage mollusk and red tree vole species. Sites would be protected consistent with current management guidelines.
19. Activities would be restricted from March 1 to July 15 within suitable unsurveyed goshawk habitat.
20. Special Status and Survey and Manage vascular plant, lichen, bryophyte, and fungi sites that require protection would be buffered. Buffer sizes would be determined based on species, proposed treatment, site-specific environmental conditions, and management recommendations.
21. Mitigation measures and buffers would be applied, as needed, to avoid disturbance to known archeological sites, .
22. Cultural resources discovered during project implementation would be reported to the authorized officers and protected until properly evaluated.
23. All road renovation, decommissioning, and/or improvement work would be limited to the dry season, generally from May 15 to October 15, or when soil moisture is less than 25 percent.
24. Dust abatement materials, such as lignin, Mag-Chloride, and/or approved petroleum based dust abatement products, would not be applied during or just before wet weather and at stream crossings or other locations that could result in direct delivery to a water body (typically not within 25' of a water body or stream channel).
25. Selected roads would be blocked and barricaded after use and before the beginning of rainy season (generally October 15).
26. When removing a culvert, slopes would be pulled back to the natural slope or at least 1:1.5 to minimize sloughing, erosion, and potential for the stream to undercut streambanks during periods of high streamflows. Stream channels would be restored to bank full width and natural grade.
27. Roads identified for decommissioning would be seeded with native seed and mulched in the same operational season they are decommissioned.
28. Temporary roads constructed for harvest operations would be decommissioned within the same operating season they are constructed.
29. Equipment would be free of weed reproductive plant parts prior to moving into the management area.
30. Divert the stream around the work area in a manner (e.g. pipe or lined ditch) that would minimize stream sedimentation. Contractor would submit a water diversion plan for approval prior to stream work. To reduce movement of sediment downstream from the project site, the use of straw bales, geotextile fabric, or coconut fiber logs/bales immediately downstream of the work area would be required.
31. Location of waste stockpile and borrow sites resulting from road construction or reconstruction would be at least one site potential tree length from a stream where sediment-laden runoff could be confined.
32. Soil disturbed during road work or culvert replacement would be seeded with native grass seed after completion of work, using appropriate native species.
33. Seed, feed grains, forage, straw, and mulch would be free of weed reproductive plant parts, as per the North American Weed Free Forage Certification Standards.

34. Apply native grass seed on landings and tractor skid trails within 50-feet of existing roads. Apply native grass seed on all helicopter landings. Use appropriate native species.
35. A Spill Prevention, Control, and Countermeasure Plan (SPCC) would be required prior to operation and would include, but not be limited to, identification of hazardous substances to be used in the project area and identification of purchasers' representatives responsible for supervising initial containment action for releases and subsequent cleanup.
36. Refueling of equipment would take place outside of the Riparian Reserves.
37. All hazardous materials and petroleum products would be stored in durable containers outside Riparian Reserves so that any accidental spills would be contained and not drain into the stream system.
38. Appropriate mitigation measures would be applied to ensure that fluids or hazardous materials from heavy equipment operations do not enter stream channels.

2.3.2 Restoration Proposals

Restoration projects are proposed in the action alternatives, Alternatives B-G. Alternative A (No Action) has no restoration projects proposed, but rehabilitation and stabilization projects proposed in the Timbered Rock Fire Emergency Stabilization Rehabilitation Plan Environmental Assessment (ESRP) would be implemented.

Four levels of restoration projects are proposed in the six action alternatives: focused, moderate, extensive, and focused within the fire perimeter. The alternatives vary by the scope of the projects (acres, miles of roads, etc.), intensity of the treatments, and location of the treatments. Restoration projects are located both within the Timbered Rock Fire perimeter and outside the fire area. Most projects are located within the Elk Creek Watershed; however, a proposed eagle nest project and some fuel management zone (FMZ) projects are located on a ridge top within adjacent watersheds. Projects are based on recommendations presented in the LSRA and/or Elk Creek WA, or were developed to address specific issues. Projects are designed to meet the objectives described in Section 1.3.1.

Projects proposed within the fire area focus on road projects to reduce existing and potential erosion from the road network, fish habitat improvement projects, development of Fuel Management Zones (FMZ), and reducing future hazardous fuel conditions within existing Northern Spotted Owl activity centers. Reforestation of the burned area was assessed in the ESRP EA. Alternatives A and E follow those recommendations. Other approaches to reforestation are presented in Alternatives B, C, D, F, and G. A reforestation study is included which would evaluate a variety of planting densities, species, and follow-up treatments in both salvage and unsalvaged areas. This reforestation research could be incorporated into any alternative. These research proposals are further described in the project descriptions with the complete study plans found in Appendix G.

Summaries of proposed restoration projects are presented below. See Appendix E for more detailed descriptions.

2.3.2.1 Fish Habitat Improvement Projects (see Map 2-1)

Project Objectives

To improve habitat complexity and passage on BLM-administered land for salmon and trout and to improve shade and future large wood recruitment in the first 160' from the stream.

Desired Future Conditions

Improved passage through culverts; logs almost parallel to the stream; rock weirs and logs to provide spawning gravel retention and rearing habitat; and trees reestablished in the Riparian Reserve to improve shade and future large wood recruitment to the stream.

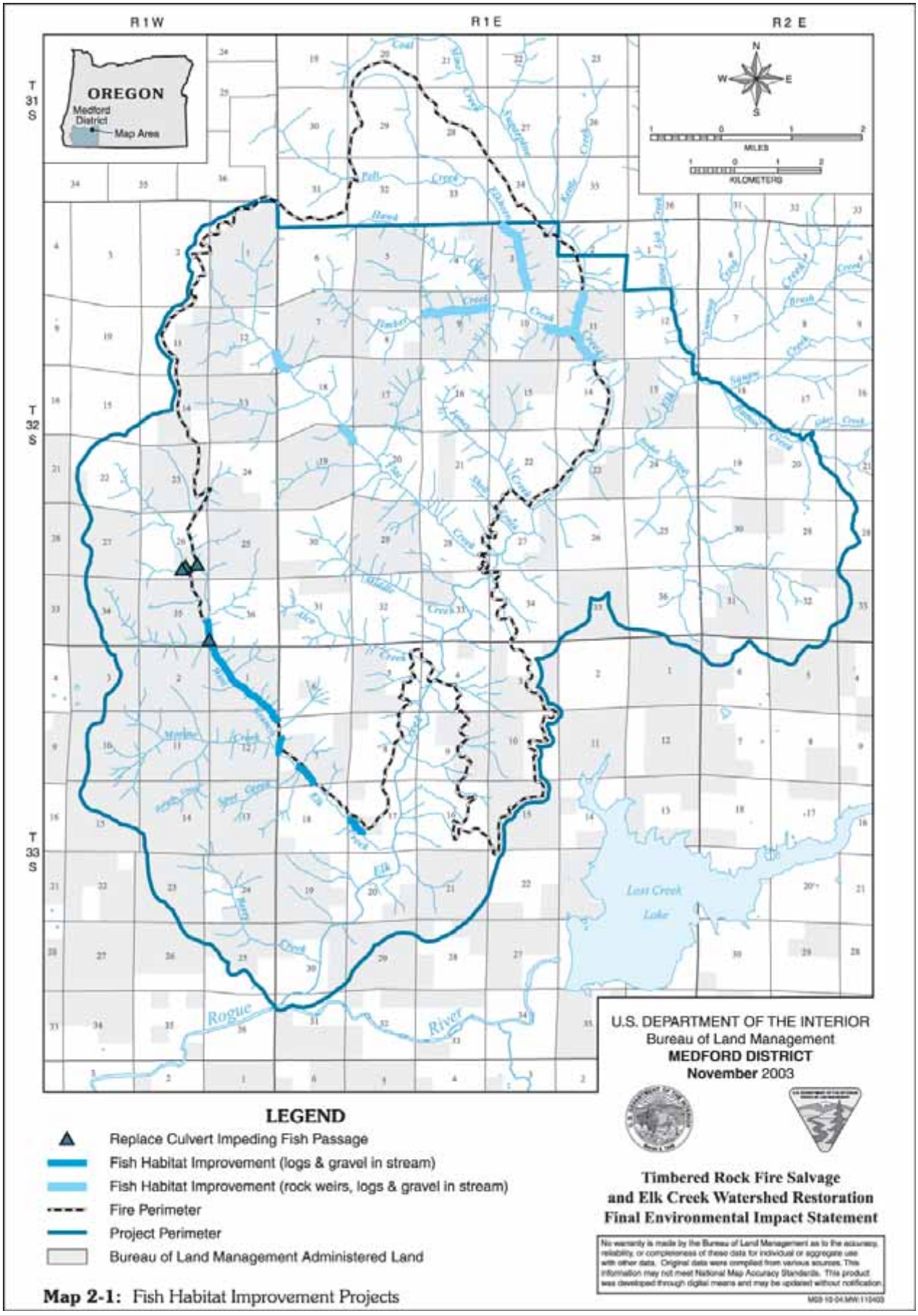
Project Design Features

Replacement of four culverts for trout and potential coho passage would open five miles of habitat. The use of rock weirs would aid in collecting gravels for spawning and create plunge pools for rearing. Rock weirs would vary from 3 weirs per mile to 10 weirs per mile. Up to 40 cubic yards of gravel would be placed above rock weirs where possible.

Where accessible, large wood (20-24" DBH) would be placed almost parallel to the streambank for adult holding cover. Log placement would vary from 15 logs per mile to 25 logs per mile. Smaller diameter trees would be taken from riparian reserve thinnings and added to the stream where appropriate. As part of the riparian thinning restoration plan, trees 10 to 80 years old would be felled within 160' of the stream for instream habitat, provided 50 percent canopy is retained. Fifteen logs per mile is based on the Klamath Province and twenty-five logs per mile is based on a mix of Klamath and Cascade Province recommendations (Shatford 2002, 23-24).

Smaller diameter trees would be taken from Riparian Reserve thinnings and added to the stream where appropriate. As part of the riparian thinning restoration plan, trees 10 to 80 years old would be thinned from 30-160 feet from stream channel, provided at least 40 percent canopy cover is retained.

Instream projects would include the use of an excavator. Any temporary skid trails needed to access the stream would be water-barred and seeded. The excavator would make a 12-foot wide path from the road to the stream, with no



Map 2-1: Fish Habitat Improvement Projects

more than ten passes on the path. No blading on the path would occur. Other resources in conflict with the designated sites would be mitigated with a buffer. Equipment would avoid archeological and botanical sites. West Branch Elk Creek includes existing logs from the fire with little supplementation needed of off-site logs. Equipment would avoid archeological and botanical sites.

2.3.2.2 Vegetation Restoration Projects (see Map 2-2)

Late-Successional Forest Habitat Restoration

Project Objectives

Accelerate the growth of trees in stands to promote late-successional conditions with a variety of size classes. Maintain species diversity to promote connectivity between owl activity sites and develop late-successional forest characteristics.

Desired Future Conditions

Suitable spotted owl habitat for nesting, roosting, and foraging composed of mature timber stands. Stands contain large conifers (21" DBH or greater), multi-layered structure, and 60 percent or greater canopy closure (USDA and USDI 2001, I-2, 3). Understory should be open between shrub layer and mid-canopy for flight paths. Nest sites include cavities 50 or more feet above the ground in large decadent old growth conifers, large mistletoe clumps, old raptor nests, and platforms formed by whorls of large branches.

Project Design Features

Stands of trees less than 8" DBH (10-29 years old) would be pre-commercially thinned (PCT) to accelerate the growth of reserve trees. Stands of trees greater than 8" DBH (30-80 years old) would be commercially thinned to increase growth on residual trees, retain and promote large branches on select trees, promote the development of variable tree sizes in the residual stand, and retain the variety of species present.

Condition 1: Young conifer plantations generally 10 to 30 years old.

These stands are comprised of conifers of similar size. Thin conifers to a spacing range of 12-15' to increase growth rates, yet allow for crown closure within 10-20 years. This would promote natural shading, mortality, and removal of lower limbs. Retain unthinnned patches up to one-half acre in size for every 10 acres thinned. Retain up to 25 percent canopy component in hardwoods. Select up to 25 trees per acre and remove all surrounding vegetation for approximately 5' beyond the dripline. This would increase growth rates and retain limbs to allow for future large branches as these trees mature and become dominant in the overstory. Pile and burn slash from operations.

Condition 2: Young stands with mixed age and size classes, scattered overstory conifers.

These stands also have variable densities of conifers and hardwoods. In areas where predominant conifer size is less than 3" DBH, thin to a spacing of 12-15'. Areas where the predominant conifer size is 3-8" DBH, thin to a spacing of 15-20'. Retain unthinnned patches up to one-half acre in size

Figure 2.3-3. Proposed Late-Successional Forest Habitat Restoration Project – Before Thinning

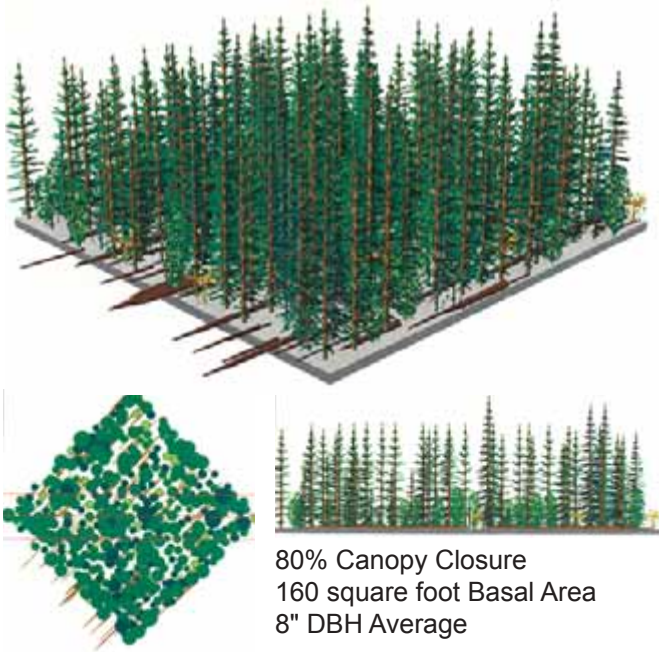
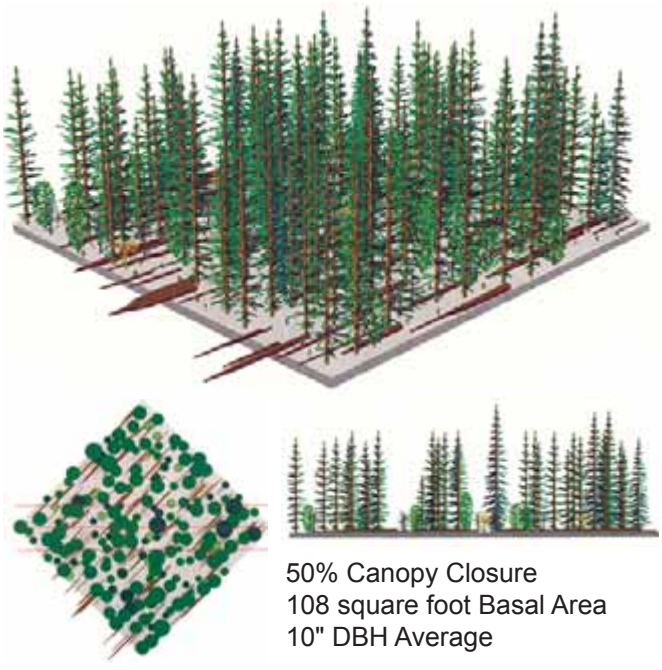


Figure 2.3-4. Proposed Late-Successional Forest Habitat Restoration Project – After Thinning



for every 10 acres thinned. Retain hardwood trees unless they constitute greater than 25 percent of the canopy. Reduce hardwood component to 25 percent of canopy in stand being treated. Pile and burn slash from operations.

Condition 3: Stands dominated by conifers in age classes from 30 to 80 years old.

Conifer and hardwood densities and size classes are variable. Stands would be thinned to a basal area range of 120-140' per acre of total overstory basal area, retaining a minimum of 50 percent canopy closure in stand. Retain unthinnned patches up to one-half acre in size for every 10 acres thinned. Retain up to 25 percent of canopy component in hardwoods. Reserve trees would be a mix of species present. Variable spacing and reserving both dominant and codominant tree sizes is preferred over even-spacing and even-size distribution of reserve trees. Pile and burn slash from operations.

Figures 2.3-3 and 2.3-4 are computer representations of a typical stand planned for late-successional restoration thinning, showing the stand before and after treatment. These figures were developed using a stand visualization system from stand exam data collected in actual units proposed for treatment.

Pine Habitat Restoration

Project Objectives

Promote pine species regeneration in areas historically inhabited by pines, retaining existing dominant pine in the overstory. Promote pine dominance in stands historically dominated by pines but presently dominated by Douglas-fir and other species.

Desired Future Conditions

Ponderosa and sugar pines dominant in the overstory up to 23 trees per acre (tpa) with a codominant component of pines (<20" DBH) up to 40 tpa. An understory of conifers dominated by pines (<12" DBH) with less than 80 tpa (USDA and USDI 1998, 179). Mix of conifers in the overstory, including Douglas-fir and incense cedar and a component of hardwoods in mid-canopy and understory including madrone and chinquapin.

Project Design Features

Stands with ponderosa or sugar pine present in overstory or understory, or historic presence of pine in overstory would be thinned to promote pine retention and growth. Large overstory pines would have non-pine vegetation in understory removed to promote pine regeneration. Stands with pine less than 80 years old would be thinned to retain pine and promote growth of existing pine in stand.

- **Stands with large (>20" DBH and >80 years old) overstory ponderosa or sugar pines present.**
  In areas where pine are not present in the understory, clear around large (>24" DBH) overstory pines for up to 20' beyond dripline to promote pine regeneration. Trees up to 24" may be removed (USDA and USDI 1998, 165). When large overstory trees are within 50' of each other, only one of those trees would receive understory clearing.

  Beyond the clearing area, pre-commercial thin (14-20 foot spacing) understory stands (<8" DBH) presently consisting of Douglas-fir, white fir, incense cedar, ponderosa and sugar pine, madrone, and chinquapin to favor dominance of pine species as residual stand.

  Beyond the clearing area, commercial thin understory stands (>8" DBH) retaining 100-180 square feet of total basal area retaining the same species preference for pine. Only trees less than 80 years old would be removed. These would generally be less than 18" DBH.

- **Stands with sugar and ponderosa pines present in overstory predominantly less than 18" DBH (30-80 years old).**
  Commercially thin these stands favoring all healthy pines for reserve trees retaining 100-180 square feet of total basal area (USDA and USDI 1998, 190).

- **Young stands less than 8" DBH with pine present and without pine in the overstory, but with historic presence of pine in the overstory.**
  Pre-commercially thin (14-20 foot spacing) stands presently consisting of Douglas-fir, white fir, incense cedar, ponderosa and sugar pine, madrone, and chinquapin to favor dominance of pine species as residual stand. Retain unthinnned patches up to one-half acre in size for every 10 acres thinned

Introduce prescribed fire into the understory after reducing initial fuel loadings through piling and burning of piles.

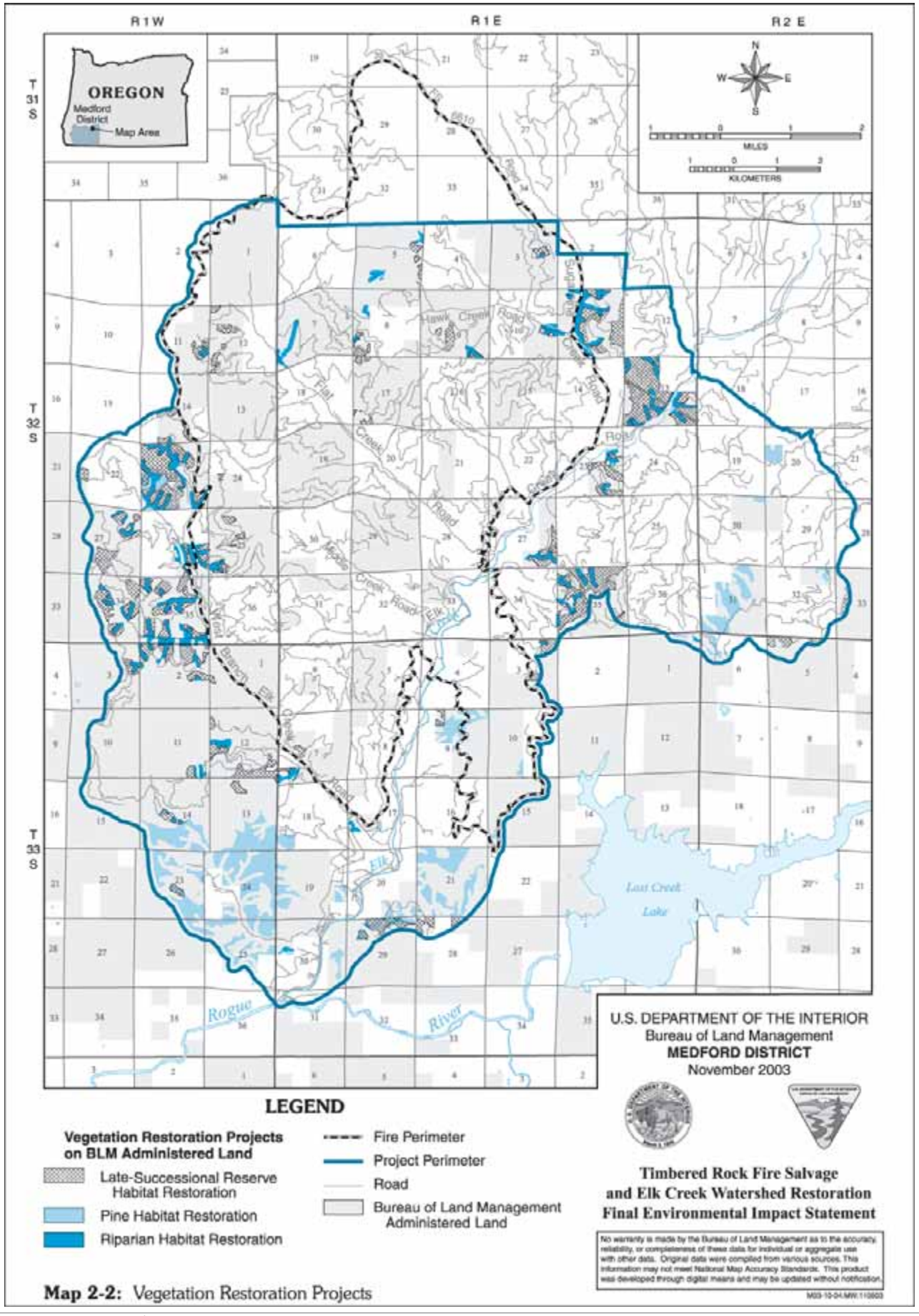
Riparian Reserve Thinning

Project Objectives

Improve the habitat and functioning of Riparian Reserves for late-successional dependent terrestrial and aquatic organisms. Accelerate the growth rates and size variability of residual trees in the existing stands and maintain species diversity.

Desired Future Conditions

Functioning riparian area that allows for late-successional species movement and stream protection, and maintains species composition and characteristics needed to attain Aquatic Conservation Strategy. Attain 75 percent late seral vegetation in riparian areas. Riparian vegetation would be dominated by large (>24" DBH) conifers with a diverse species composition including riparian hardwoods and mixed conifer species. Conifer species of preference would be Douglas-fir, incense cedar, and pacific yew, with western hemlock and white fir in the upper elevations (above 3,500') and ponderosa and sugar pines in the lower elevations (below



Map 2-2: Vegetation Restoration Projects

3,000'), particularly on south exposures. Hardwood species to favor include alder, big leaf maple, and Oregon ash. Canopy closures would generally be greater than 70 percent. The stand would be able to supply amounts and distributions of coarse woody debris sufficient to sustain physical stability and complexity (USDI 1995, 22).

Project Design Features

Stands of trees less than 8" DBH (10-30 years old) within Riparian Reserves would be pre-commercially thinned to accelerate the growth of residual trees. Retain unthinnned patches up to one-half acre in size for every 10 acres thinned. Stands of trees greater than 8" DBH (30-80 years old) would have up to 12 dominant tpa selected and competing trees with crowns touching would be felled or girdled. This would be done to increase growth of residual trees, promote large branches on select trees, and develop the recruitment of large woody material for streams. Felling and girdling would occur on trees less than 20" DBH. Thinning would be performed on an irregular spacing with reserve trees selected to aid in the development of future stand characteristics such as variable spacing, multistory canopies, large limbs, and canopy gaps (USFS 2000). Pile and burn slash from treatments in stands <8" DBH. Leave a no-cut buffer zone 50' from streams containing coho salmon and 30' from all other streams.

Figures 2.3-5 and 2.3-6 are computer representations of a typical stand planned for Riparian Reserve thinning, showing the stand before and after treatment. These figures were developed using a stand visualization system from stand exam data collected in actual units proposed for treatment.

Oak Woodland and Meadow Restoration (see Map 2-3)

Project Objectives

Maintain or enhance oak woodland and meadow values for wildlife, range, plants, and biological diversity. Protect and improve special habitats within the Elk Creek Watershed.

Desired Future Conditions

Oak woodlands in an open condition that favors large oaks and pines and a diversity of native grasses, forbs, and shrubs and also provides for future regeneration of oaks and pines. Meadows would be in an open condition with healthy native grasses and forbs.

Project Design Features

Management activities could include manually thinning small-diameter white oak; removing competing conifers; clearing around large, healthy pine; manually cutting, piling, and burning older brush patches; and applying frequent low-intensity prescribed fire. Meadow openings would be maintained by removing Douglas-fir and incense cedar from around the edges of meadows.

Figure 2.3-5. Proposed Riparian Reserve Thinning – Before Treatment

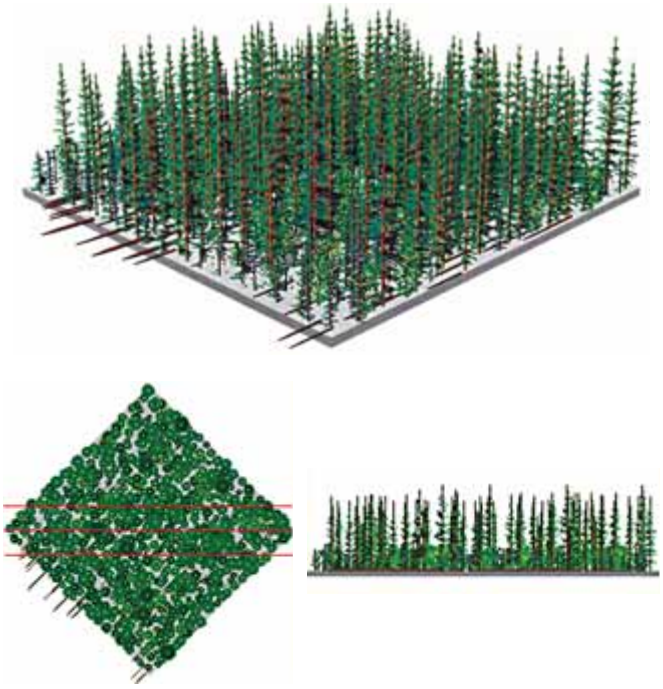
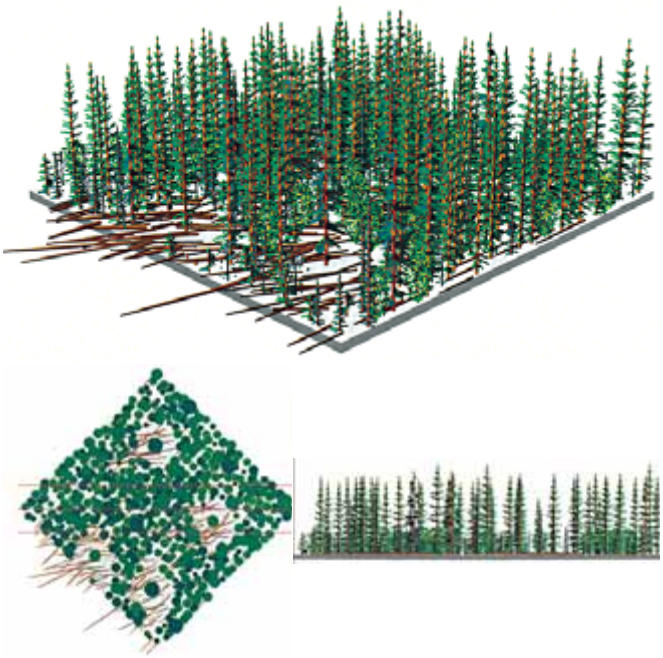


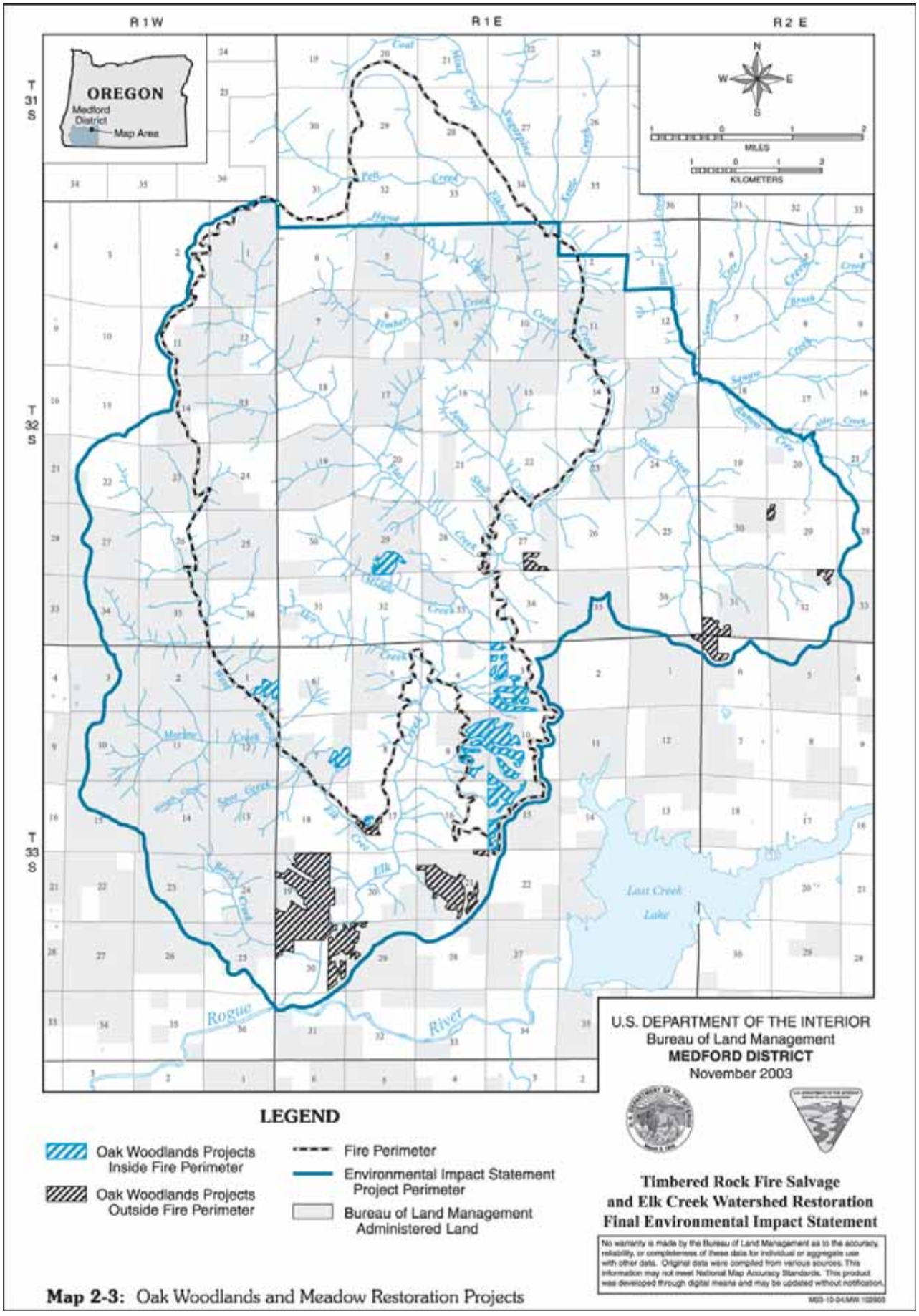
Figure 2.3-6. Proposed Riparian Reserve Thinning – After Treatment



Inside the fire perimeter, sites would be monitored and treatment applied when vegetative conditions warrant (in 5-15 years). Those conditions are:

- Numerous small conifer seedlings reappearing on a site.
- Large amounts of brush seedlings reoccupying the site.
- Oak resprouting or oak seedlings reoccupying the site.

Outside the fire perimeter, site-specific treatment would



Map 2-3: Oak Woodlands and Meadow Restoration Projects

include the following:

- Manually thinning small-diameter white oak.
- Manually thinning small competing conifers.
- Clearing around large, healthy pine.
- Manually cutting, piling and burning older brush patches.
- Applying low-intensity fire.
- Stagger treatments over several years so areas are treated at different times and oak woodlands are in different successional stages across the landscape. Treatments would not begin until at least 2004.

Prescribed fire would be applied under conditions when a low intensity, short-duration fire would occur. Heat flame-length would average 3 feet or less. Fires would need to be prescribed while reestablishing vegetation is small enough to be susceptible to the low flame lengths. Some manual slashing of woody vegetation may be required prior to burning in order to meet resource objectives.

Reforestation (see Map 2-4)

Project Objectives

Reforest areas that supported forest vegetation before the fire. Plant areas with species representative of the plant series existing in those forest stands. Place a stand on a pathway toward a mixed conifer forest that can, more quickly, obtain the attributes of a late-successional forest than would occur naturally.

Desired Future Conditions

Mixed conifer stands at age 20 with a minimum of 70 percent canopy closure and a hardwood component of up to 25 percent of canopy. Retain a residual level of remnant overstory trees, snags, and coarse woody debris as described in stand advisories for late-successional habitat or the LSRA. This is an interim stage. The final condition for stands in this watershed is described in the proposed Late-Successional Forest Habitat Restoration project.

Project Design Features

Areas burned at high or moderate severity levels would be planted with tree seedlings to a species mix consistent with those species present in those locations before the fire. Priority for planting would be in past plantations, areas with slopes greater than 65 percent, riparian areas, and remaining areas of high or moderate burn intensity, including spotted owl activity centers.

Reforestation Research Project

Project Objectives

To evaluate mixed-species reforestation plantings, to identify and characterize temporal patterns of vegetation structural development and species diversity, to assess temporal dynamics of fuels loading and fire risk, and to determine impacts of snag retention on survival and growth of planted trees.

For the initial phases of stand development, there are six specific research objectives to determine the effects of:

1. snag retention on the survival and establishment of planted seedlings by species,
2. planted seedling versus natural regeneration on tree survival and growth,
3. monoculture versus mixed-species plantings on planted seedling survival and growth,
4. planting density on survival and growth of planted seedlings by species, and site occupancy by planted and naturally regenerating trees, shrubs, and herbs,
5. weed control on planted seedling establishment and growth of trees, shrubs, and herbs, and
6. physiographic site conditions on planted seedling survival and growth of trees, shrubs, and herbs

Desired Future Conditions

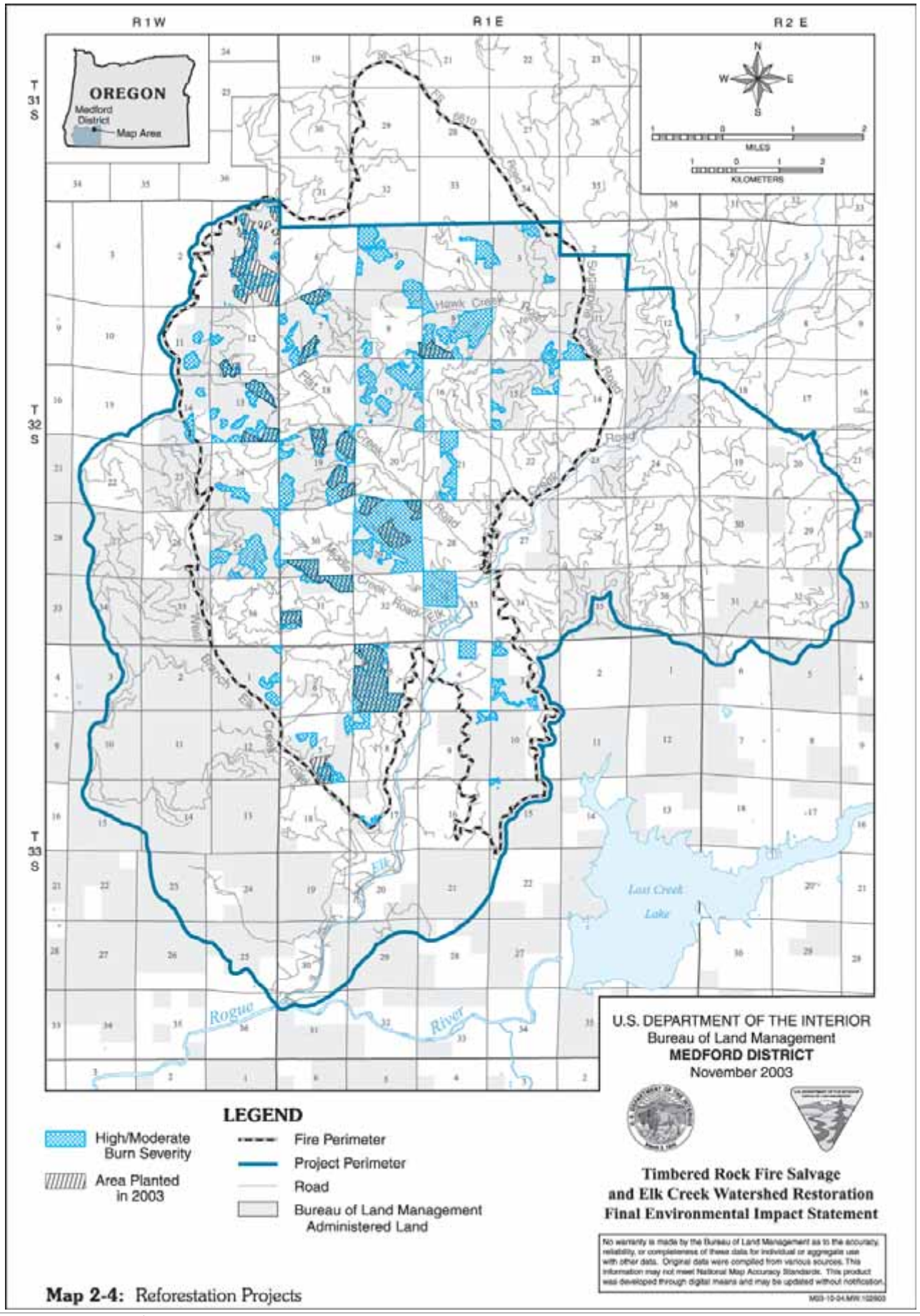
Forest stands having a high degree of species and structural diversity (relative to monospecific plantations) in which Douglas-fir, white fir, and incense cedar contribute to the main overstory canopy as codominants; dispersed sugar pine and ponderosa pine having complex canopy structure and large diameter stems and branches as dominants; and sub-canopy hardwood trees providing structural continuity between understory shrubs and the overstory.

Project Design Features

This planting is a research project designed to provide a rigorous basis for evaluating the efficacy of snag retention, mixed-species plantings, variable planting density, and woody vegetation removal as means for regulating the development of biologically and structurally complex forest stands, and for varying the temporal dynamics of fuels profiles and fire risk.

Six species composition, planting density, and vegetation removal treatments (weeding) would be established:

1. Unplanted, woody vegetation not removed
2. Douglas-fir, planted at 435 tpa, woody vegetation removed
3. Mixed species planting, 435 tpa, woody vegetation removed



Map 2-4: Reforestation Projects

4. Mixed species planting, 435 tpa, woody vegetation not removed
5. Mixed species planting, 190 tpa, woody vegetation removed
6. Mixed species planting, 190 tpa, woody vegetation not removed

Woody vegetation removal on designated treatment plots will be completed manually prior to planting, in year 1 and in year 3; and in year 5 if necessary, following planting.

Species mixes will consist of the following:

- Sites 3500'+ elevation – Douglas-fir, 20%; White fir, 20%; sugar pine, 20%; incense cedar and ponderosa pine, 20%; hardwood sprouts (Pacific madrone and/or chinquapin oak) 20%.
- Sites <3500' elevation – Douglas-fir, 40%; sugar pine, 20%; incense cedar and ponderosa pine, 20%; hardwood sprouts (Pacific madrone and/or chinquapin oak) 20%.

Where specified, hardwood densities will be obtained by retaining hardwood sprouts, thinned to a single stem per clump, at the 20 percent proportion prescribed.

The treatments will be implemented on both unsalvaged and salvaged sites to evaluate effect of residual snags as microsite modifiers on seedling establishment. Some treatments will be replicated on moderate and harsh planting sites as defined predominantly by aspect (northerly vs. southerly), but also taking into account soil depth (shallow vs. deep) and slope position (mid vs. upper).

A total of 56, 1.5 acre plots will be established and allocated by treatment condition as outlined in Table 1 of the *Vegetation Dynamics and Fire Hazard in Experimental Mixed-species Restoration Plantings in Southwestern Oregon* in Appendix G - Research Proposal .

2.3.2.3 Fuels Treatment Projects (see Map 2-5)

Fuel Management Zones (FMZ)

Project Objectives

Create FMZs to assist in future wildfire suppression activities, to provide for firefighter safety, and to provide anchor points for control lines. To meet the LSRA recommendation for breaking the watershed into 5,000 to 7,000 acre blocks. Construction of FMZs would also meet intent of National Fire Plan by providing protection to Communities at Risk and Wildland Urban Interface areas.

Desired Future Conditions

A series of FMZs on the ridgelines, on the perimeter and within the LSR. Anchor points for fire lines, burnout operations, and possible safety zones for firefighters. LSR divided by FMZs into blocks of 5,000 to 7,000 acres to reduce future fire size (see Figures 2.3-7 and 2.3-8).

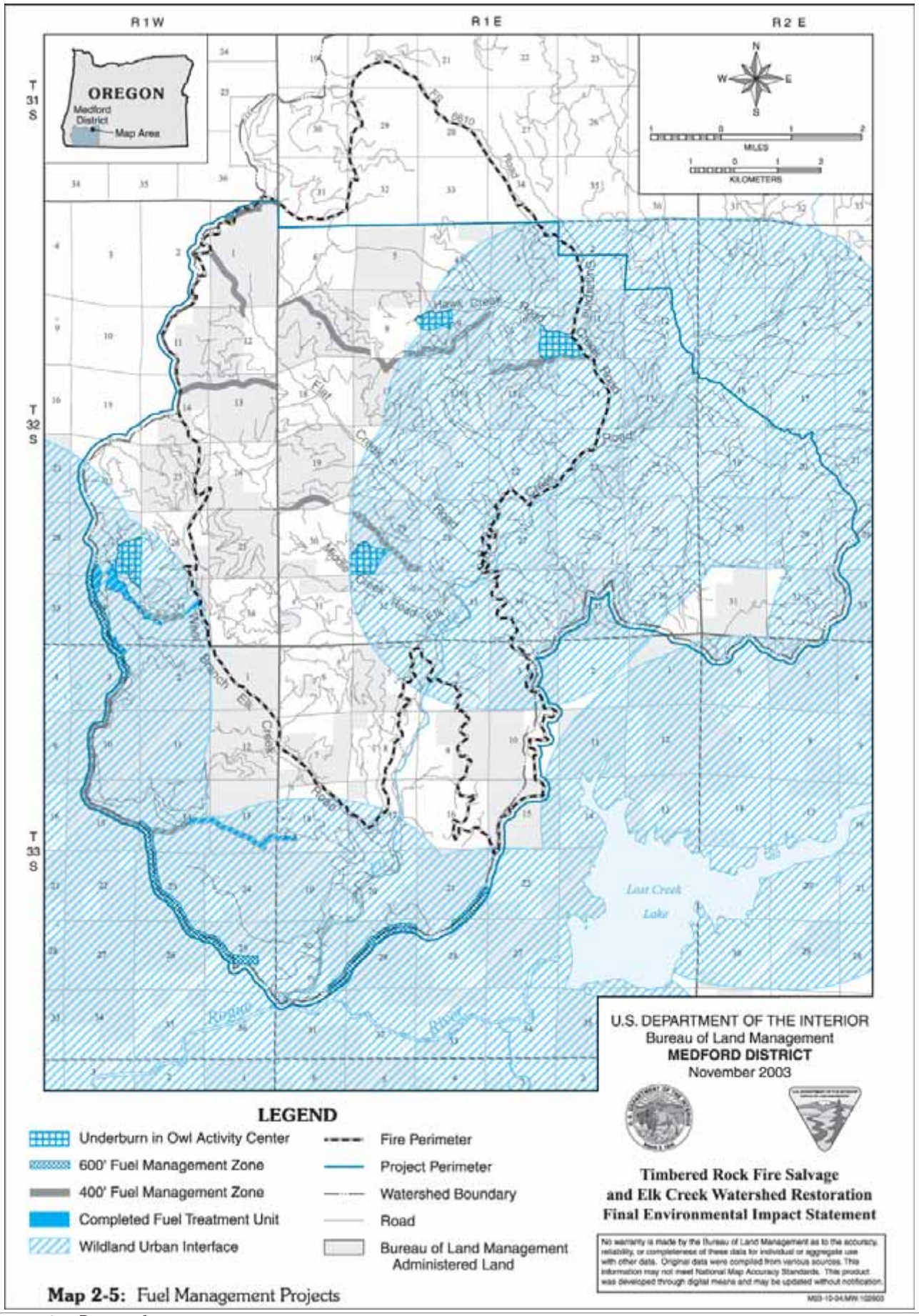
Project Design Features

Within the burn perimeter, stand replacement areas less than 10 acres would be salvaged to reduce fuel loadings and reduce spotting potential. Proposed units would be located within an identified FMZ and cover approximately 10 acres. A target of six snags per acre would be left standing on or near the ridge top. The preferred leave snags would be the shorter snags. The understory vegetation would be cut, piled, and burned.

In FMZs proposed in the unburned portion of the watershed, the understory conifers and hardwoods would be thinned and slash would be hand-piled. Hand-cutting, hand-piling, and burning of brush would occur. The majority of the conifers cut would be 6" DBH and less. In some cases, small diameter commercial conifers would be cut and removed as needed to reduce crown bulk density to a level that would not perpetuate crown fires. After ladder fuel loadings are

Figure 2.3-7. Existing FMZ

Figure 2.3-8. Aerial view of Existing FMZ



Map 2-5: Fuel Management Projects

reduced, an underburn would be conducted to further reduce ground fuels. This treatment would occur two to five years after the initial entry. A second underburn would occur 10-15 years later. At that time, initial treatment would be finished and any further treatments would be considered maintenance.

Removal of brush and sub-merchantable timber would be accomplished through hazardous fuel reductions contracts. Merchantable timber would be removed through a timber sale contract, where feasible. Approximately 35 acres located in T33S, R1W, Sections 14 and 15 would be proposed for commercial thinning.
The West Branch Fire of 1972, located in T32S, R2W, was reforested and pre-commercially thinned. This area burned again in the Timbered Rock Fire. Stand diameters range from 3-8 inches. Young conifers in this area killed in the Timbered Rock Fire would be cut, piled, and burned. This would aid in reforestation efforts and reduce fuel loads to help reduce future fire severity.

Owl Activity Center Underburns

Project Objectives

The short-term objective is to reintroduce fire to maintain existing reduced fuel loadings and current fuel profiles created by the Timbered Rock Fire, and to simulate the historic natural disturbance process. The long-term objective is to increase the resiliency of sites during future high intensity fire events by reducing fire severity while maintaining owl habitat in late-successional forest conditions.

Desired Future Conditions

Multi-storied stands with low ground fuel loadings. These stands would have a break in the ladder fuels from the ground to the overstory canopy layer.

Project Design Features

This action would capitalize on the natural fuel reduction created by the Timbered Rock Fire. The proposal calls for underburning when fuel moistures for the larger, 6-inch or greater (1000-hour) fuels are at a level too moist for total consumption. The primary carrier of the prescribed fire would be the 0 to 3-inch (1- to 100-hour) fuels, litter layer, and any small brush the fire would consume. These treatments are being proposed on a limited scale to demonstrate effectiveness and ability to meet prescription requirements. The units would be configured using logical topographic breaks and may include all or portions of the owl activity centers and some adjacent areas. In addition, some burning outside the activity centers would be proposed using logical topographic breaks. Burning would occur outside of nesting season.

Initial entry would be in the next 2-3 years or later, if site conditions warrant. The need for follow up treatments would be evaluated and treatment would be proposed when fuel buildups approach the mid- to high-range of Fuel Model 11, or prior to reaching the mid-range of Fuel Model 10 (see Appendix M for fuel model descriptions). The second treatment would occur in 5-10 years and further treatments would occur in the 10- to 20-year range. All treatments will be based on actual conditions and timeframes are approximate. Seasonal restrictions would be implemented to avoid disturbing spotted owl nesting activities.

2.3.2.4 Wildlife Projects (see Map 2-6)

Eagle Nesting Habitat Enhancement

Project Objectives

To promote growth and future development of large overstory trees into trees with large limbs or broken tops suitable for nesting eagles.

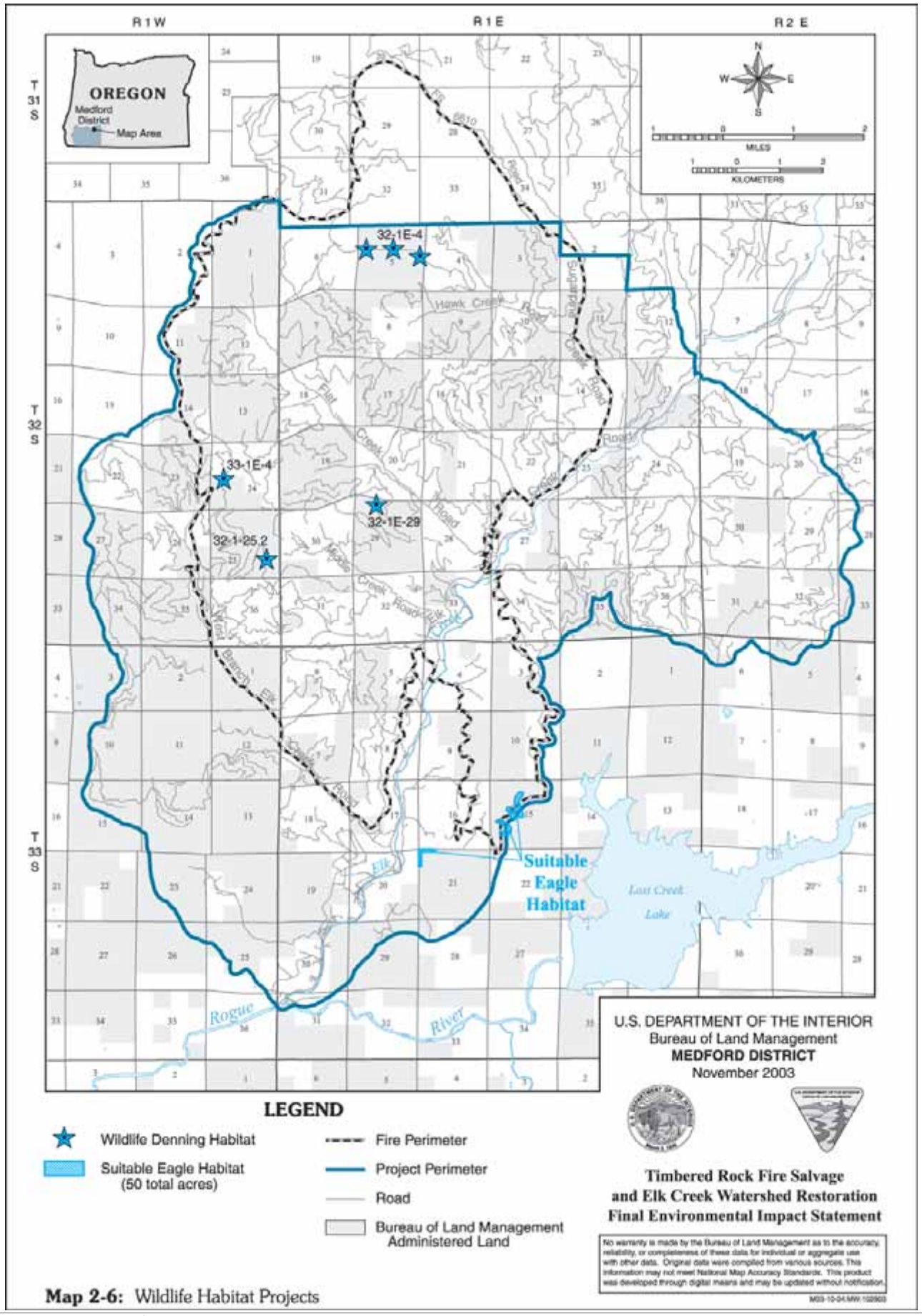
Desired Future Conditions

Scattered individuals and groups of large overstory ponderosa pine, sugar pine, and Douglas-fir trees with large limbs suitable for supporting eagle nests and with openings between branching whorls. The trees would have an open or broken canopy or would be located near the edge of the stand so the eagles would have an unrestricted flyway. Tall perch trees would be present at the edges of the stand. These nest stands would be located on the ridge between Lost Creek Lake and Elk Creek.

Project Design Features

Younger stands would be treated to promote growth of large overstory ponderosa pine, sugar pine, and Douglas-fir with large boles and thick limbs, strong enough to support the large stick nests built by bald eagles and golden eagles. Smaller trees around the meadow edges would be thinned. A residual conifer spacing of 12-20' would be implemented in stands less than 30 years old to promote the development of large trees with the desired habitat attributes, such as large limbs and whorls.

Stands with existing large overstory trees, treatments would improve the vigor of large overstory sugar pine, ponderosa pine, and Douglas-fir. Removing competing vegetation around selected trees would increase resistance to mortality from fire. Vegetation would be removed around the reserved large trees by clearing 10-15' out from the drip line of the pine. Co-dominant trees with crowns touching the selected trees would be removed unless the removal would harm reserve trees. Projects would be coordinated with proposed fuel management projects.



Map 2-6: Wildlife Habitat Projects

Two areas are proposed for treatment:

- T33S, R1E, Section 15 - Around the meadows in the north central part of the section and the NWSW part of the section. The project would occur along the west side of the meadow and extend 300 feet into the stand. Two areas extend outside the project boundary into the Lost Creek Watershed; approximately 200 feet in one area and 100 feet in the second area.
- T33S, R1E, Section 21 - Located within a proposed pine restoration project area. The project would occur along the north and west edge and extend 300 feet into the stand.

Maintain or Create Log Piles for Wildlife Habitat

Project Objectives

To provide denning/hiding/resting/foraging/escape sites for animals, including larger mammals such as American martin, fisher, bobcat, cougar, and bear.

Desired Future Conditions

Scattered piles of large wood with spaces to provide denning, hiding, resting, foraging, or escape sites for animals, including larger mammals such as American martin, fisher, bobcat, cougar, and bear.

Project Design Features

During salvage operations, leave piles of fallen logs in the selected areas where trees were cut to clear the right-of-way for the Pacific Power powerline in T32S, R1E, Section 5. Selected piles would be located near the east and west borders of section and one in the middle, away from the road.

Place or leave three additional piles of larger wood between West Branch Elk Creek and Flat Creek. These would be at or near the end of a road that will be closed either with a permanent block, earthen berm, or gate. This would be completed as part of the roadside salvage. Piles would be located in areas where roads identified for decommissioning are closed to traffic.

Piles should be approximately 20' x 20' and 4-6' high and provide space to allow animals access within the piles. Larger logs (>16" DBH) would be stacked in a loose, crisscross/haphazard pile in a way that would create spaces beneath the wood. The logs could be smaller lengths, broken tops, and boles large enough to stack with spaces between.

Logs would be obtained from salvage operations. Broken parts and whole logs would be hauled to location and piled. Piles should be located in the largest accumulation of trees. Pile locations could be moved to a different site if adjacent land owners object to specific road closures, or if there are inadequate snags in an area near the selected location.

2.3.2.5 Road Projects (see Map 3-3b)

Road Reconstruction

Project Objectives

Stabilize roads to reduce the risk of road failure.

Desired Future Conditions

Roads in a stable condition with a low risk of failure.

Project Design Features

Add drainage structures such as culverts and armored drain dips to reduce the chance of the road becoming saturated by water and failing. Remove unstable material from shoulders of roads and place large rocks on the face to armor the surface and function as a retaining structure to hold the fill in place. It is anticipated there would be a greater need for maintenance on roads within the fire over the next few years.

Road Stream-Crossing Upgrades

Project Objectives

Reduce the risk of road damage from debris torrents plugging culverts and diverting stream flows down roads.

Desired Future Conditions

Road fills constructed of rock, rather than mixed soil and rock fills at stream crossings in high risk locations. Road segments below the pipe would be protected from water or debris torrents diverting from the channel and eroding a gully in the roadbed.

Project Design Features

Road fills constructed out of soil and rock fill material at high risk stream crossings would be replaced with rock fills. These fills would be designed with a dip over the culvert to keep the stream flow in the channel in case the culvert plugs. Culverts would be upsized to pass 100-year storm events and allow movement of water, gravels, and debris through the culvert.

Road Maintenance

Project Objectives

To restore or improve road segments identified in the Transportation Management Objectives (TMO) process to the desired standard.

Desired Future Conditions

To maintain road access through BLM-administered lands

while minimizing erosion and sedimentation from these roads and protecting water quality.

Project Design Features

Roads would be maintained and improved, as needed. Maintenance may include: blading and shaping the road surface, adding rock to the road surface, brushing the roadsides, cleaning the ditches, cleaning culvert catch basins, cleaning or replacing culverts, and adding drainage structures such as culverts and drain dips.

Road Decommissioning

Objectives

To reduce the road density in the Key Watershed by decommissioning road segments identified in the TMO process. In addition, identify road segments for closure to reduce wildlife harassment, degradation to the road surface, and trash dumping.

Desired Future Conditions

Appropriate access to provide for administrative needs and public use. Most roads out of the riparian areas, and few with native surfaces. Access across public lands through reciprocal rights agreements will be maintained.

Project Design Features

Roads will be decommissioned or closed as identified from the TMO process.

Seasonal Road Closures (see Map 2-7)

Objectives

Reduce damage to road surface during the wet season and protect sensitive fish species from surface road erosion; protect wildlife from poaching and harassment; and reduce trash dumping.

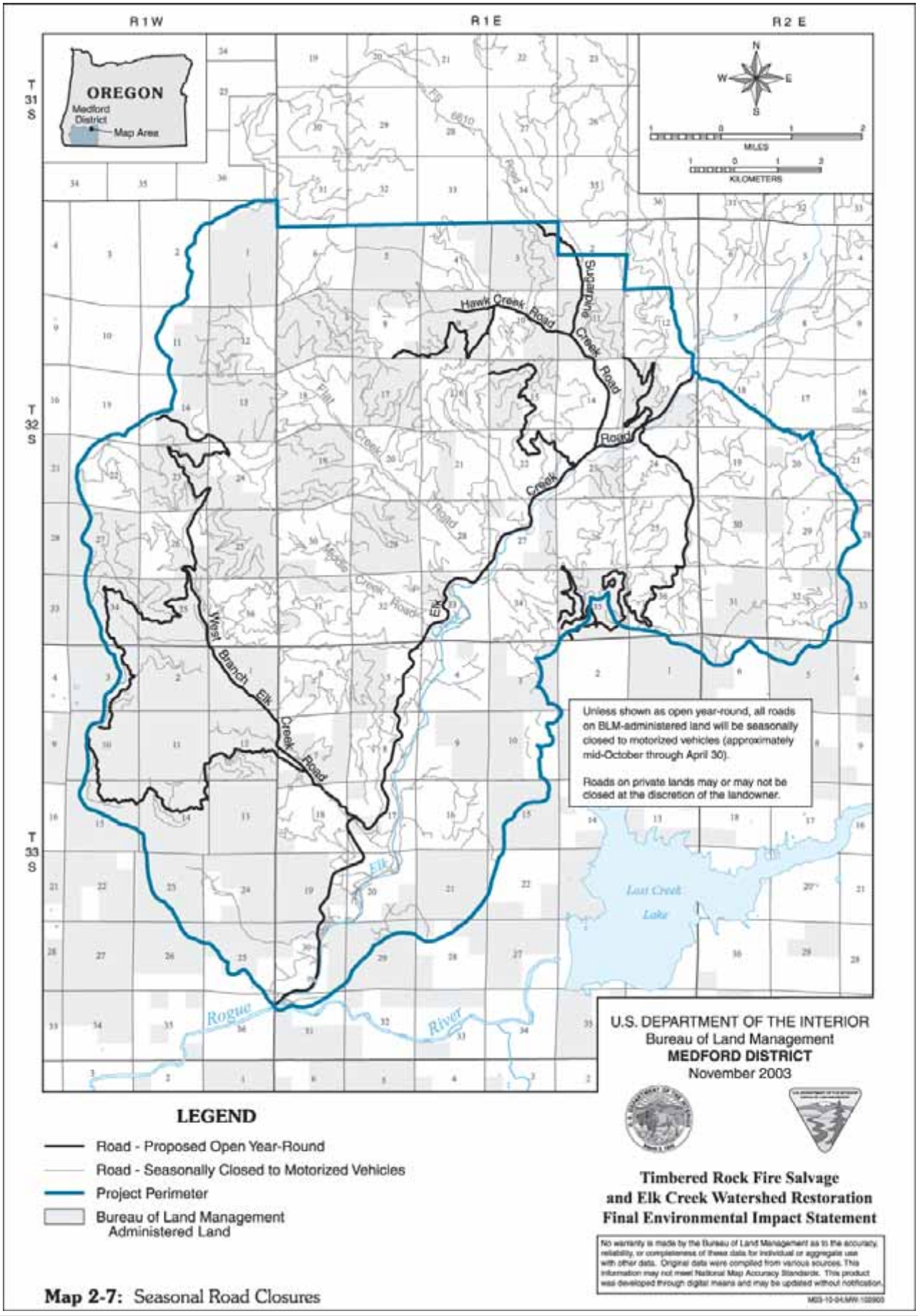
Desired Future Conditions

Year-round vehicle access would be restricted to mainline roads. Secondary and non-surfaced roads would be seasonally closed to motorized vehicles from mid-October through April 30. Only foot and non-motorized traffic would be allowed on closed roads during the wet season. All roads would be available for motorized vehicle traffic (unless fire restrictions are in place) from May 1 through mid-October. Roads would remain open to administrative access for landowners, BLM employees, and BLM contractors and permittees.

Project Design Features

Road closures would be seasonally closed to motor vehicles from mid October through April 30. Roads across private lands may or may not be closed by the landowner.

Mainline roads open to motorized vehicles year around:
- 33-1W-8.0, Buck Rock Road to West Branch;
- 33-1W-10.0;
- 32-1W-26.1, Morine Tie Road;
- 33-1E-17.0;
- 32-1W-26.0 to intersection with 32-1W-23.2, West Branch Elk Creek Road;
- 32-1W-26.5, Alco Creek Road
- 32-1E-27.0;
- 32-1E-18.0 to intersection with 32-1E-18.3;
- 32-1E-20.0 to 32-1E-17.4;
- 32-1W-13, Flat Creek Road;
- 32-1E-17.4 to 32-1E-17.5 to 32-1E-7.2;
- 32-1E-23.2;
- 32-1E-22.0, Miller Mountain Road;
- 32-1E-23.0 to intersection with 32-1E-9.1, before stream ford, Sugarpine Creek Road;
- 32-1E-10.1 to 32-1E-9.0;
- 32-1E-9.0, Gobblers Knob Road;
- 32-1E-11.4 and FS 31, Elkhorn Ridge Road;
- 32-1E-13.1 to intersection with 13.2 and 32-1E-13.2 to end of rocked area at boundary with section 11, North Mule Hill;
- 32-1W-23.2, Ragsdale Butte;
- 32-1W-36.1.



Map 2-7: Seasonal Road Closures

2.3.2.6 Pump Chance Reconstruction (see Figure 2.3-9)

Project Objectives

To restore existing pump chances and helicopter dip ponds for future fire suppression needs.

Desired Future Conditions

To have pump chances and helicopter dip ponds that will hold adequate pools of water, about 500 gallons, to be used primarily for initial attack fire suppression.

Project Design Features

Seven sites have been identified for restoration. The work would include cleaning pump chance pools by excavating gravels, soil, and vegetation that have built up. Excavated materials would be moved to an appropriate disposal site. Water inlets and outlets would be cleaned or repaired and rock would be added to access ramps as needed. Access ramps should have an adequate rock surface and be brushed to accommodate up to 4,000 gallon water tenders. Cascade Frogs would be protected by a seasonal restriction with no restoration occurring from mid-March to August 31.

2.3.2.7 Rock Quarry Closure and Rehabilitation (see Figure 2.3-9)

Project Objectives

To close and rehabilitate rock quarries where the usable rock has been depleted and to minimize erosion from steep side slopes and lack of vegetation.

Desired Future Conditions

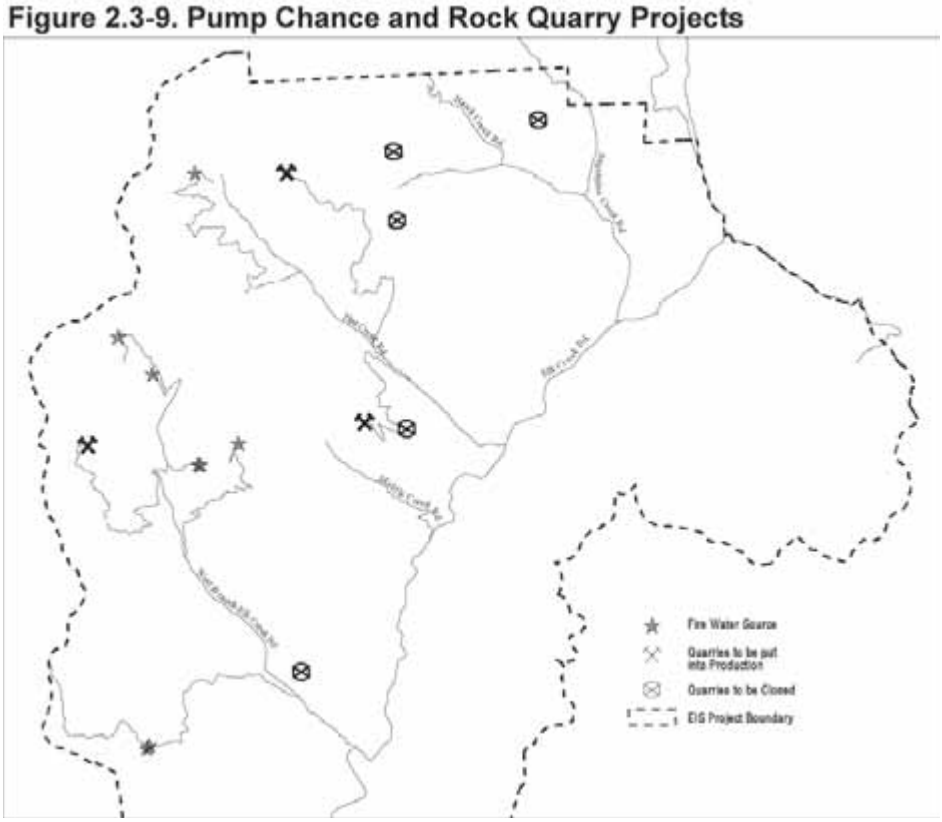
Abandoned rock quarries with vegetation growing in them and blended into the landscape.

Project Design Features

Rock quarries that are no longer viable would have benches sloped, soil imported (if necessary), and vegetation planted. Any oversized or usable material would be stored at the quarry or moved to another location where it would be stored until needed.

Five quarries are proposed for treatment: Gobblers Knob, Elk Horn Creek, Hawk Creek, Old Flat Creek, and West Branch Elk Creek.

Figure 2.3-9. Pump Chance and Rock Quarry Projects



2.4 Alternatives

2.4.1 Alternative A No Action or Continuation of Current Management

2.4.1.1 Salvage

Area Salvage

- No programmed area salvage.

Salvage of Roadside Hazard Trees

- Salvage of hazardous trees would be determined through appropriate NEPA documentation.

2.4.1.2 Restoration

Continue current management under NFP and RMP direction and the Timbered Rock Fire Emergency Stabilization/ Rehabilitation Plan (ESRP). Continue to plan and implement other restoration projects as funding and time permits.

Projects identified in the ESRP:

- Plant trees within fire perimeter (6,000 acres).
- Cancel cattle grazing for 2003 and 2004 season.
- Survey for and treat noxious weeds along firelines.
- Seed with native grass.
- Seed intensely burned areas greater than 35 percent slope, disturbed areas, meadows, and non-timbered lands.
- Provide structure in stream channels using natural material or construct check dams.
- Add large wood to Hawk, Sugar Pine, Timber, Flat, Middle, Elk, and West Branch Elk creeks and six unnamed tributaries.
- Collect seed to grow native riparian species.
- Plant hardwoods and brush species in Riparian Reserves.

2.4.2 Alternative B No Salvage and Focused Restoration

2.4.2.1 Salvage

Area Salvage

- No programmed area salvage.

Salvage of Roadside Hazard Trees

- Salvage of hazardous trees would be determined through appropriate NEPA documentation.

2.4.2.2 Restoration

Implement a focused level of restoration projects. Emphasis would be placed on reducing non-commercial size vegetative competition in overstocked stands with density management treatments, fuels reduction treatments, and pine habitat restoration. Areas proposed for treatment would be those in most need of competing vegetation reduction. Within the fire perimeter, restoration would focus on high priority road work. LSR restoration actions would focus on non-commercial projects.

Fish Habitat Improvement

- Replace 4 culverts.
- Install 3 rock weirs per mile.
- Install 15 instream logs per mile.

Vegetation Projects

LSR Forest Habitat Restoration

- Pre-commercial thin 1,102 acres of stands 10-30 years old; greater than 40 percent canopy closure; less than 8" DBH.

Pine Habitat Restoration

- Pre-commercial thin 156 acres of stands with pine 10-30 years old; less than 8" DBH.

Riparian Reserve Thinning

- Thin 117 acres of stands 10-30 years old; 40 percent or greater canopy closure; less than 8" DBH.
- Perennial streams.

Oak Woodlands and Meadow Restoration

- Thin 1,003 acres; less than 8" DBH; underburn.
- Treat high priority areas (outside Timbered Rock Fire perimeter).

Reforestation

- Priority areas for planting:
  1. Pre-fire plantations.
  2. Severely burned areas with slopes greater than 65 percent.
  3. Stand replacement areas greater than 10 acres.
  4. High priority riparian areas (high burn severity areas).
  5. Fifty foot strips along high burn severity fish streams.
- Plant at 10' x10' spacing with microsite emphasis (planting next to logs, stumps, etc.).
- Replant if stocking falls below 100 trees per acre (tpa).
- Plant mixed species.
- Avoid mulching, tubing and shading until replanting.
- Remove competing brush around all seedlings if stocking less than 250 tpa.
- Remove brush around half the trees if stocking greater than 250 tpa.

Fuels Treatment Projects

Fuel Management Zones (FMZ)

- Treat 1,300 acres along ridgelines 400' outside the LSR and 200' within the LSR.

Owl Activity Center Underburns

- Underburn 425 acres within 4 owl activity centers; 3 within the fire perimeter and 1 outside the fire perimeter but within the LSR.

Fuels Treatment within West Branch Fire

- Cut, pile and burn fire-killed trees <8" DBH within old burn.

Wildlife Projects

Eagle Nesting Habitat Enhancement

- Thin 50 acres; thin thickets of trees 10-30 years old around adjacent meadows to 12-20' spacing; clear 10-15' from dripline around existing larger overstory trees.
- Thin trees less than 8" DBH.
- Leave larger cut trees on site.

Log Piles for Wildlife Habitat

- No sites would be developed.
- Previously felled trees along Pacific Power powerline in T32S, R1E, Section 5 would be left in place.

Road Projects

Road Reconstruction

- Reconstruct 2.6 miles of road.
- Add drainage structures and rock blankets.

Road Stream-Crossing Upgrades

- Upgrade 15 sites at highest risk of fill failure.
- Replace existing culverts to pass 100-year storm event.
- Replace existing road fill with rock fill.

Road Maintenance

- Renovate or improve 100 miles.

Road Decommissioning

- Partial decommission of 2.5 miles of road.
- Full decommission of 32 miles of road.
- Close 21 miles of road with a gate or guardrail barricade.

Seasonal Road Closures

- None.

Pump Chance Restoration

- Restore 7 sites.

Rock Quarry Closure and Rehabilitation

- Close and rehabilitate 5 quarries.

2.4.3 Alternative C South Cascades LSRA Criteria for Salvage and Moderate Restoration

2.4.3.1 Salvage

Area Salvage

- Salvage 247 acres using guidelines from the South Cascades LSRA (see Appendix B).
- Harvest in stand-replacement patches greater than 10 acres; less than 40 percent canopy closure.
- Use small patch clear cuts or group selection – (LSRA example: In a 50-acre unit, ten 5-acre units are preferable to one 50-acre unit).
- Harvest systems would include:
  - cable - 123 acres
  - tractor - 21 acres
  - helicopter - 91 acres
  - bull-line - 12 acres
- Construct and rehabilitate .25 miles of temporary road.
- No new permanent roads.
- Roadside hazard acres within available area salvage units would contribute to the salvageable acres of that unit.
- Salvage a minimum of 10 percent and maximum of 20 percent of available acres per stand in stand replacement units where snag densities exceed the median “typical level” (see Appendix B, Table 50 in LSRA). Typical levels are determined by Plant Series. Maximum salvage treatment area would be based on the percent of the existing snag density above this typical level (see Appendix D for stand snag summary).

If **Existing snag density is,**	then **Salvage**
0 - 10% above typical levels	10% of stand-replacement acres
11% - 20% above typical levels	Equal % of stand-replacement acres
20% or more above typical levels	20% of stand-replacement acres

- Follow Landscape Decision Process Criteria (see Appendix B) for each stand.
- Prohibit salvage in the following areas:
  1. Low and very low burned areas (40 percent or greater live canopy).
  2. Riparian areas.
  3. Patches less than 10 acres.

- Retain all pre-fire CWD and snags.

Salvage of Roadside Hazard Trees

- Roadside salvage 1,078 acres.
- Salvage previously felled hazard trees along Pacific Power powerline in T32S, R1E, Section 5; felled trees in riparian areas, needed to meet CWD requirements, or for log piles for wildlife habitat project would be left.
- BLM would identify and salvage hazard trees along roads or roads needed for post-fire operations except roads within riparian areas and owl activity centers with suitable habitat.
- BLM would identify only immediate hazards along proposed haul roads within riparian areas and owl activity centers.
- Hazard trees identified by road users within riparian areas and remaining owl activity centers with suitable habitat would be felled and left in place, except where trees or portions of trees fall within road prism.
- Snag levels would be met within adjacent areas not identified as hazard trees.
- Pre-fire CWD would be left.
- Hazard trees would be identified according to OSHA guidelines (see Appendix D for guidelines).

2.4.3.2 Restoration

Implement moderate level of restoration.

Fish Habitat Improvement

- Replace 4 culverts.
- Install 5 graveled rock weirs per mile.
- Install 20 logs instream per mile.

Vegetation Treatments

LSR Forest Habitat Restoration

- Pre-commercial thin 862 acres of stands 10-30 years old; less than 8" DBH.
- Commercial thin 466 acres of mid-seral stands 30-80 years old; greater than 8" DBH.
- Treat stands with greater than 70 percent canopy closure.
- Leave CWD level of 5 percent ground cover per acre.
- Commercially remove CWD in stands with an excess of LSRA CWD levels.
- Leave all existing snags.

Pine Habitat Restoration

- Pre-commercial thin 16 acres of pine stands 10-30 years old; less than 8" DBH to encourage pine growth.
- Commercial removal in the following:
  - Thin 91 acres of mid-seral stands 30-80 years old;
  - Clear around pine trees greater than 24”
  - Thin on 686 acres of stands over 80 years old.

Riparian Habitat Restoration

- Perennial streams.
- Pre-commercial thin 225 acres of stands 10-30 years old; less than 8" DBH.
- Thin 134 acres of mid-seral stands 30-80 years old; greater than 8" DBH.
- Girdle trees where thinning would result in excessive fuel loading (greater than 20 tons per acre).
- Place some thinned trees into stream for fish habitat restoration.
- No commercial timber removal.

Oak Woodlands and Meadows Restoration

- Thin 1,554 acres; less than 8" DBH; underburn.
- Treat areas within the watershed, including the Timbered Rock Fire.

Reforestation

- Priority areas for planting:
  1. Pre-fire plantations.
  2. Severely burned areas with slopes greater than 65 percent.
  3. Stand-replacement areas greater than 5 acres.
  4. High priority riparian areas (high burn severity areas).
  5. Fifty foot strips along high burn severity fish streams.
- Plant at 10' x10' spacing using microsite emphasis (planting next to logs, stumps, etc.).
- Replant when stocking falls below 100 tpa.
- Plant mixed species.
- Avoid mulching, tubing, and shading until replanting.
- Remove competing brush around all the seedlings if stocking less than 250 tpa.
- Remove brush around one-half the trees if stocking greater than 250 tpa.

Fuels Treatment Projects

Fuel Management Zones (FMZ)

- Treat up to 1,300 acres along ridgelines; 400' outside the LSR and 200' within the LSR.
- Commercially thin 62 acres; 150' on both side of ridges in T33S, R1W, Sections 14 and 15.

Owl Activity Center Underburns

- Underburn 425 acres within 4 owl activity centers; 3 within the fire perimeter and 1 outside the fire perimeter but within the LSR.

Fuels Treatment within West Branch Fire

- Cut, pile, and burn fire killed trees < 8" within old burn.

Wildlife Projects

Eagle Nesting Habitat Enhancement

- Thin 50 acres; thin thickets of trees 10-30 years old around adjacent meadows to 12'-20' spacing; clear 10'-15' from dripline around existing larger overstory trees; less than 8" DBH.
- Leave larger cut trees on site.

Log Piles for Wildlife Habitat

- Develop 6 sites.
- Logs 16" DBH or greater would be placed in piles 20' x 20' x 5'.

Road Projects

Road Reconstruction

- Reconstruct 2.6 miles of road.
- Add drainage structures and rock blankets.

Road Stream-Crossing Upgrades

- Upgrade 11 sites at risk of fill failure.
- Replace existing culverts to pass 100-year storm event.
- Replace existing road fill with rock fill.

Road Maintenance

- Maintain or improve 100 miles of road.

Road Decommissioning

- Partial decommission of 2.5 miles of road.
- Full decommission of 32 miles of road.
- Close 21 miles of road with a gate or guardrail barricade.

Seasonal Road Closures

- None.

Pump Chance Restoration

- Restore 7 sites.

Rock Quarry Closure and Rehabilitation

- Close and rehabilitate 5 quarries.

2.4.4 Alternative D LSR Salvage using DecAID Wood Advisor for Snags and CWD and Moderate Restoration

2.4.4.1 Salvage

Area Salvage

- Salvage 820 acres.
- Salvage in stand replacement patches greater than 10 acres; less than 40 percent canopy closure.
- Use small patch clear cuts or group selection. Openings created would not exceed 20 acres.
- Use snag and CWD levels from DecAID Wood Advisor (see Appendix D).
- Roadside hazard acres within available area salvage units would contribute to the salvageable acres of those units.
- Harvest systems include:
  - cable - 368 acres
  - tractor - 112 acres
  - helicopter - 321 acres
  - bull-line - 19 acres
- Construct and rehabilitate 0.6 miles of temporary road.
- No net gain in permanent roads.
- Prohibit salvage in the following areas:
  1. Low and unburned areas; 40 percent or greater live canopy
  2. Riparian areas
  3. Patches less than 10 acres in size
  4. Selected owl activity centers in T32S, R1W, Section 1 and T33S, R1W, Section 1
  5. Retain all pre-fire CWD and snags.

Salvage of Roadside Hazard Trees

- Roadside salvage 1,064 acres.
- BLM would identify hazard trees along open roads or roads needed for temporary use for post-fire operations.
- BLM would identify only immediate hazards along proposed haul roads within riparian areas and owl activity centers.
- Salvage identified hazard trees along BLM-administered roads.
- Salvage previously felled hazard trees along Pacific Power powerline in T32S, R1E, Section 5, except for felled trees in riparian areas, needed to meet CWD requirements, or needed for logs for wildlife habitat project.
- Snags levels would be met by snags within adjacent area not identified as hazard trees.
- Leave pre-fire coarse woody debris.
- Hazard trees identified according to OSHA guidelines (see Appendix D for guidelines).
- Hazard trees within riparian areas and remaining owl activity centers with suitable habitat would be cut and left in place, except where trees or portions of trees fall within road prism.

2.4.4.2 Restoration

Implement moderate level of restoration.

Fish Habitat Improvement

- Replace 4 culverts.
- Install 5 graveled rock weirs per mile.
- Install 20 logs instream per mile.

Vegetation Treatments

LSR Forest Habitat Restoration

- Pre-commercial thin 862 acres of stands 10-30 years old; less than 8" DBH.
- Commercial thin 466 acres of mid-seral stands 30-80 years old; greater than 8" DBH.
- Treat stands with greater than 70 percent canopy closure.
- Leave CWD level of 2 percent ground cover per acre.
- Commercially remove CWD in stands with an excess of DecAID levels.
- Leave all existing snags.

Pine Habitat Restoration

- Pre-commercial thin 16 acres of pine stands 10-30 years old; less than 8" DBH to encourage pine growth.
- Commercial removal in the following:
  - Thin 91 acres of mid-seral stands 30-80 years old;
  - Clear around pine trees greater than 24″
  - Thin on 686 acres of stands over 80 years old.

Riparian Habitat Restoration

- Perennial streams.
- Pre-commercial thin 225 acres of stands 10-30 years old; less than 8" DBH.
- Thin 134 acres of mid-seral stands 30-80 years old; greater than 8" DBH.
- Girdle trees where thinning would result in excessive fuel loading (greater than 20 tons per acre).
- Place some thinned trees into stream for fish habitat restoration.
- No commercial timber removal.

Oak Woodlands and Meadows Restoration

- Thin 1,554 acres; less than 8" DBH; underburn.
- Treat areas within the watershed, including the Timbered Rock Fire.

Reforestation

- Priority areas for planting:
  1. Pre-fire plantations.
  2. Severely burned areas with slopes greater than 65 percent.
  3. Stand replacement areas greater than 5 acres.
  4. High priority riparian areas (high burn severity areas).
  5. Fifty foot strips along high burn severity fish streams.
- Plant at 10' x10' spacing using microsite emphasis (planting next to logs, stumps, etc.).
- Replant when stocking falls below 100 tpa.
- Plant mixed species.
- Avoid mulching, tubing, and shading until replanting.
- Remove competing brush around all the seedlings if stocking less than 250 tpa.
- Remove brush around one-half the trees if stocking greater than 250 tpa.

Fuels Treatment Projects

Fuel Management Zone (FMZ)

- Treat up to 1,300 acres along ridgelines; 400' outside the LSR and 200' within the LSR.
- Commercially thin 62 acres; 150' on both side of ridges in T33S, R1W, Sections 14 and 15.

Owl Activity Center Underburns

- Underburn 425 acres within 4 owl activity centers; 3 within the fire perimeter and 1 outside the fire perimeter but within the LSR.

Fuels Treatment within West Branch Fire

- Cut, pile, and burn fire-killed trees <8″ within old burn.

Wildlife Projects

Eagle Nesting Habitat Enhancement

- Thin 50 acres; thin thickets of trees 10-30 years old around adjacent meadows to 12-20' spacing; clear 10-15′ from dripline around existing larger overstory trees; less than 8" DBH.
- Leave larger cut trees on site.

Log Piles for Wildlife Habitat

- Develop 6 sites.
- Place logs 16" DBH or greater in piles 20' x 20' x 5'.

Road Projects

Road Reconstruction

- Reconstruct 2.6 miles of road.
- Add drainage structures and rock blankets.

Road Stream-Crossing Upgrades

- Upgrade 11 sites at risk of fill failure.
- Replace existing culverts to pass 100-year storm event.
- Replace existing road fill with rock fill.

Road Maintenance

- Maintain or improve 100 miles of road.

Road Decommissioning

- Partial decommission of 2.5 miles of road.
- Full decommission of 32 miles of road.
- Close 21 miles of road with a gate or guardrail barricade.

Seasonal Road Closures

- None.

Pump Chance Restoration

- Restore 7 sites.

Rock Quarry Closure and Rehabilitation

- Close and rehabilitate 5 quarries.

2.4.5 Alternative E High Level of Salvage and Extensive Restoration

2.4.5.1 Salvage

Salvage would be considered in all burn severity levels. This would include areas where stand-replacement occurred as well as stands with scattered or clumps of fire-killed trees. Snag levels within the high and moderate severity areas would be based on levels suggested in study by Haggard and Gaines in 2001. This study concluded the highest diversity in cavity nesting species and highest number of nests were found in densities ranged from 6-14 snags per acre.

Area Salvage

- Salvage 3,269 acres.
- Salvage fire-killed trees in all stands(high/moderate/low/unburned severity areas).
- In high and moderate burn severity areas:

  Leave 8 snags per acre in Douglas-fir plant series.

  Leave 12 snags per acre in White fir plant series.

  Snags will be greater than 14" DBH.
- In low and very low burn severity areas, leave 4 snags per acre greater than 14" DBH.
- In all stands, leave minimum of 120 linear feet per acre of CWD per acre greater than 16" DBH.
- Harvest systems include
  - cable - 853 acres
  - tractor - 165 acres
  - helicopter - 2,063 acres
  - bull-line - 188 acres
- Construct and rehabilitate 1.5 miles of temporary road.
- No net increase in permanent roads.
- Prohibit salvage in riparian areas.

Salvage of Roadside Hazard Trees

- Roadside salvage 536 acres.
- BLM would identify hazard trees along open roads or roads needed for temporary use for post-fire operations.
- BLM would identify only immediate hazards along proposed haul roads within riparian areas and owl activity centers.
- Salvage previously felled hazard trees along Pacific Power powerline in T32S, R1E, Section 5, except for felled trees in riparian areas, needed to meet CWD requirements, or needed for logs for wildlife habitat project.
- Salvage identified hazard trees along BLM-administered roads.
- Snags levels would be met by snags within adjacent area not identified as hazard trees.
- Leave pre-fire CWD.
- Hazard trees would be identified according to OSHA guidelines (see Appendix D for guidelines).
- Leave identified hazard trees within riparian areas and remaining owl activity centers with suitable habitat except where trees or portions of trees fall within road prism.

2.4.5.2 Restoration

An extensive level of restoration projects would be implemented.

Fish Habitat Improvement

- Replace 4 culverts.
- Install 10 graveled rock weirs per mile.
- Install 25 instream logs per mile.

Vegetation Projects

LSR Forest Habitat Restoration

- Pre-commercial thin 1,102 acres of stands 10-30 years old; less than 8" diameter.
- Commercial thin 876 acres of mid-seral stands 30-80 years old; greater than 8" diameter.
- Treat stands with greater than 40 percent canopy closure.
- Commercial removal in stands where CWD levels in excess of 2.0 percent ground cover occurs (DecAID Advisor, see Appendix D).
- All pre-fire snags would be left.

Pine Habitat Restoration

- Pre-commercial thin 156 acres of stands 10-30 years old with pine; less than 8" diameter.
- Commercial removal in these stands:
  - Thin 162 acres of mid-seral stands 30-80 years old.
  - Clear around pine trees greater than 24" and thin on 1,687 acres of stands over 80 years old.

Riparian Habitat Restoration

- All streams.
- Pre-commercial thin 437 acres of stands 10-30 years; less than 8" DBH.
- Thin 613 acres of mid-seral stands 30-80 years old; greater than 8" DBH.
- Girdle trees where thinning results in excessive fuel loading (greater than 20 tons per acre).
- Place some thinned trees into stream for fish habitat restoration.
- No commercial removal.

Oak Woodlands and Meadow Restoration

- Thin 1,544 acres; less than 8" DBH; underburn.

- Treat areas within the watershed, including the Timbered Rock Fire.

Reforestation
- Follow ESRP.
- Plant 6,000 acres.
- Plant hardwoods and brush species in Riparian Reserves.

Fuels Treatment
Fuel Management Zones (FMZ)
- Treat up to 1,300 acres along ridgelines; 400' outside the LSR and 400' within the LSR.
- Commercially thin 35 acres; 150' on both sides of ridges in T33S, R1W, Sections 14 and 15.

Owl Activity Center Underburn
- Underburn 425 acres within 4 owl activity centers; 3 within the fire perimeter and 1 outside the fire perimeter but within the LSR.

Fuels Treatment within West Branch Fire
- Cut, pile, and burn fire killed trees <8" DBH within old burn.

Wildlife Projects
Eagle Habitat Improvement
- Thin 50 acres to promote growth and development in large trees.
- Clear 10' to 15' from dripline around existing larger overstory trees.
- Thin thickets of younger trees around adjacent meadows to a spacing of 12'-20'.
- Thin trees less than 8" DBH.

Log Piles for Wildlife Habitat
- Develop 6 sites.
- Place logs 16" DBH or greater in piles about 20' x 20' x 5'.

Road Projects
Road Reconstruction
- Reconstruct 2.6 miles of road.
- Add drainage structures and rock blankets.

Road Stream-Crossing Upgrades
- Upgrade 26 sites at risk of fill failure.
- Replace culverts to pass 100-year storm event.
- Replace existing road fill with rock fill.

Road Maintenance
- Maintain or improve 115 miles of road.

Road Decommissioning
- Partial decommission of 5.3 miles of road.
- Full decommission of 38 miles of road.
- Close 21 miles of roads with a gate or guardrail barricade.

Seasonal Road Closures
- Approximately 114 miles of seasonal road closures on secondary and non-surfaced roads.
- Closure would be implemented between October 15 through April 30.

Pump Chance Restoration
- Restore 7 sites.

Rock Quarry Closure and Rehabilitation
- Close and rehabilitate 5 quarries.

2.4.6 Alternative F Salvage logging and restoration actions focused only within the Timbered Rock Fire perimeter.

[NOTE: This alternative is based on a report titled *Recommendations for Ecologically Sound Post-Fire Salvage Management and Other Post-Fire Treatments on Federal Lands in the West* (Beschta, et al. 1995) and offers a number of guidelines regarding salvage of fire-killed trees and post-fire rehabilitation projects. This alternative represents an interpretation and application of some of those guidelines.]

2.4.6.1 Salvage
Area Salvage
- Salvage 213 acres.
- Salvage pockets of dead trees between 3-10 acres in size located in green stands; leave a minimum of 2 acres untouched within each pocket.
- Snags and CWD levels provided by unsalvaged areas.
- Harvest systems include:
  - cable - 46 acres
  - tractor - 29 acres
  - helicopter - 122 acres
  - bull-line - 16 acres
- No net increase in permanent roads.
- No salvage in the following areas:
  1. Clumps of dead trees less than 3 acres or greater than 10 acres
  2. High and moderate burn severity areas
  3. Erosive sites or sites where accelerated erosion is possible
  4. Fragile soils
  5. Steep slopes
  6. Riparian areas

Salvage of Roadside Hazard Trees
- Roadside salvage 1,182 acres.
- BLM would identify hazard trees along open roads or roads needed for temporary use for post-fire operations

- BLM would identify only immediate hazards along proposed haul roads within riparian areas and owl activity centers.
- Salvage previously felled hazard trees along Pacific Power powerline in T32S, R1E, Section 5, except for felled trees in riparian areas, needed to meet CWD requirements, or needed for logs for wildlife habitat project.
- Salvage of hazard trees along BLM-administered roads.
- Snags levels would be met by snags within adjacent area not identified as hazard trees.
- Only felled hazard trees would be salvaged; pre-fire coarse woody debris would be retained.
- Hazard trees identified according to OSHA guidelines (see Appendix D for guidelines).
- Hazard trees identified within riparian areas and remaining owl activity centers with suitable habitat would be left in place, except where trees or portions of trees fall within road prism.

2.4.6.2 Restoration

The Beschta, et al. report does not address actions outside of a burned area. As a result, no LSR restoration actions are proposed. Restoration within the burn area would be as follows:

Fish Habitat Improvement

- Replace 4 culverts.
- Install 3 graveled rock weirs per mile.
- Install 25 instream logs per mile.

Vegetation Projects

LSR Habitat Restoration

- None.

Pine Habitat Restoration

- None.

Riparian Habitat Restoration

- None.

Oak Woodlands and Meadow Restoration

- Within fire perimeter, thin 540 acres; less than 8" DBH; underburn.

Reforestation

- Delay planting or seeding for 3 years to determine if natural regeneration is occurring.
- Plant in riparian areas and on slopes greater than 65 percent.
- 10'x10' spacing.

Fuels Treatments

Fuel Modification Zones (FMZ)

- Treat 500 acres of ridgelines within fire perimeter; 200' outside the LSR and 200' within the LSR.

Owl Activity Center Underburns

- Underburn 300 acres in 3 owl activity centers within the Timbered Rock Fire.

Fuels Treatment within West Branch Fire

- Cut, pile, and burn fire-killed trees < 8" DBH within old burn.

Wildlife Projects

Eagle Habitat Improvement

- None.

Log Piles for Wildlife Habitat

- Develop 6 sites.
- Place logs 16" DBH or greater in piles about 20'x20'x5'.

Road Projects (within fire perimeter)

Road Reconstruction

- Reconstruct 2.6 miles of road.
- Add draining structures and rock blankets.

Road Stream-Crossing Upgrades

- Upgrade 26 sites at risk of fill failure.
- Replace culverts to pass 100-year storm event.
- Replace existing road fill with rock fill.

Road Maintenance

- Maintain or improve 68 miles of road.

Road Decommissioning

- Partial decommission of 1.4 miles of road.
- Full decommission of 15.1 miles of road.
- Close 14 miles of roads with a gate or guardrail barricade.

Seasonal Road Closures

- None.

Pump Chance Restoration

- Restore 3 sites.

Rock quarry closure and rehabilitation

- Restore and rehabilitate 5 quarries.

2.4.7 Alternative G (Preferred Alternative) Salvage Based on Research Questions and Salvage in Stand Replacement Units greater than 10 Acres; Moderate Restoration (see Map 2-6f)

2.4.7.1 Salvage

Salvage would be considered in stand replacement (high and moderate burn severity) areas greater than 10 acres and less than 40 percent canopy closure. Two types of area salvage proposed – "research units" and "remaining area." Salvage in research units would be based on responding to research questions revolving around the influences of post-fire salvage and salvage intensities on wildlife species. Snag levels in research units would be based on study design. Snag levels in remaining area salvage units would be based on DecAID wood advisor and other local and regional references (see Appendix D).

Area Salvage

1. Research Units

Salvage would be based on responding to research questions revolving around the influences of post-fire salvage and salvage intensities on wildlife species. Snag levels in research units would be based on study design.

- Salvage 282 acres.
- 12 units included in research proposal.
- Units are 30 acres or greater.
- Three treatments levels implemented:
  1. Control – no salvage activity.
  2. Moderate Salvage – 30% unsalvaged; 70% salvaged leaving 6 snags per acre greater than 20" DBH.
  3. Heavy Salvage – entire site salvaged leaving 6 snags per acre greater than 20" DBH.
- Salvage would occur in approximately 11 acres of Riparian Reserve.
- Harvest systems include:
  - cable - 136 acres
  - tractor - 7 acres
  - helicopter - 139 acres

2. Remaining Area Salvage

Salvage outside of research units, "remaining area," would consider salvaging of stand replacement (high and moderate burn severity) areas greater than 10 acres and less than 40 percent canopy closure. Snag levels in these units would be based on DecAID Wood Advisor and other local and regional references (see Appendix D).

- Salvage 679 acres in units greater than 10 acres.
- Use small patch clear cuts or group selection. Openings created would not exceed 20 acres.
- Snags would be retained in reserved area outside of cut patches
- Leave average of 8 snags per acre in Douglas-fir plant series.
- Leave average of 12 snags per acre in White fir plant series.
- Snags will be greater than 14" DBH.
- Harvest systems include:
  - cable - 266 acres
  - tractor - 106 acres
  - helicopter - 272 acres
  - bull-line - 35 acres
- Construct and rehabilitate 0.9 miles of temporary road.
- No new permanent roads.
- Prohibit salvage in riparian areas.

Salvage of Roadside Hazard Trees

- Roadside salvage 1,188 acres.
- BLM would identify hazard trees along open roads or roads needed for temporary use for post-fire operations.
- BLM would identify only immediate hazards along proposed haul roads within riparian areas and owl activity centers.
- Salvage previously felled hazard trees along Pacific Power powerline in T32S, R1E, Section 5, except for felled trees in riparian areas, needed to meet CWD requirements, or needed for logs for wildlife habitat project.
- Salvage hazard trees along BLM-administered roads.
- Snag levels would be met by snags within adjacent area not identified as hazard trees.
- Pre-fire coarse woody debris would be retained.
- Hazard trees identified according to OSHA guidelines (see Appendix D for guidelines).
- Hazard trees identified within riparian areas and remaining owl activity centers with suitable habitat would be left in place, except where trees or portions of trees fall within road prism.

2.4.7.2 Restoration

Implement moderate level of restoration.

Fish Habitat Improvement

- Replace 4 culverts.
- Install 5 graveled rock weirs per mile.
- Install 20 instream logs per mile.

Vegetation Projects

LSR Forest Habitat Restoration

- Pre-commercial thin 862 acres of stands 10-30 years old; less than 8" DBH.

- Commercial thin 466 acres of mid-seral stands 30-80 years old; greater than 8" DBH
- Treat stands greater than 70 percent canopy closure.
- Commercial removal in stands in excess of LSRA CWD retention levels.
- Leave all pre-fire snags.

Pine Habitat Restoration

- Pre-commercial thin 16 acres of young pine stands; cut trees less than 8" DBH to encourage pine growth.
- Commercial removal in the following:
  - Thin 91 acres of mid-seral stands 30-80 years old;
  - Clear around pine trees greater than 24" DBH.
  - Thin on 686 acres of stands over 80 years old.

Riparian Habitat Restoration

- Perennial streams.
- Pre-commercial thin 225 acres of stands 10-30 years; less than 8" DBH.
- Thin 134 acres of mid-seral stands 30-80 years old; greater than 8" DBH; no commercial removal.
- Girdle trees where thinning would result in excessive fuel loading (greater than 20 tons per acre).
- Place some thinned trees into stream for fish habitat restoration.

Oak Woodland and Meadow Restoration

- Thin 1,544 acres; less than 8" DBH; underburn.
- Treat areas within and outside the fire perimeter.

Reforestation

- Priority areas for planting:
  1. Pre-fire plantations.
  2. Severely burned areas with slopes greater than 65 percent.
  3. Stand replacement areas greater than 5 acres.
  4. High priority riparian areas (high burn severity areas).
  5. Fifty foot strips along high burn severity fish streams.
- Plant at 10' x10' spacing with microsite emphasis (planting next to logs, stumps, etc.).
- Replant when stocking falls below 100 tpa.
- Plant mixed species.
- Avoid mulching, tubing, and shading until replanting.
- If stocking less than 250 tpa, remove competing brush around all the seedlings; if stocking greater than 250 tpa, remove brush around one-half the trees.
- Implement Timbered Rock Mixed-Species Reforestation Study.

Fuels Treatments

Fuel Modification Zones (FMZ)

- Treat 1,300 acres along ridgelines; 400' outside the LSR and 200' within the LSR.
- Commercial thin 62 acres; 150' on both side of ridges in T33S, R1W, Sections 14 and 15.

Owl Activity Center Underburns

- Underburn 425 acres within 4 owl activity centers; 3 within the fire perimeter and 1 outside the fire perimeter but within the LSR.

Fuels Treatment within West Branch Fire

- Cut, pile, and burn fire killed trees <8" DBH within old burn.

Wildlife Projects

Eagle Habitat Improvement

- Thin 50 acres to promote growth and development in large trees
- Clear 10'-15' from dripline around existing larger overstory trees.
- Thin thickets of younger trees around adjacent meadows to a spacing of 12'-20'.
- Thin trees less than 8" diameter

Log Piles for Wildlife Habitat

- Develop 6 sites.
- Place logs 16" DBH or greater in piles about 20'x20'x5'.

Road Projects

Road Reconstruction

- Reconstruct 2.6 miles of road.
- Add drainage structures and rock blankets.

Road Stream-Crossing Upgrades

- 11 sites at risk of fill failure.
- Replace culverts to pass 100-year storm event.
- Replace existing road fill with rock fill.

Road Maintenance

- Maintain or improve 100 miles of road.

Road Decommissioning

- Partial decommission of 2.5 miles of road.
- Full decommission of 32 miles of road.
- Close 21 miles of road with a gate or guardrail barricade.

Seasonal Road Closures

- Approximately 114 miles of seasonal road closures on secondary and non-surfaced roads.
- Closure would be implemented between October 15 through April 30.

Pump Chance Restoration

- Restore 7 sites.

Rock Quarry Closure and Rehabilitation

- Close and rehabilitate 5 quarries.

2.5 Range of Reasonable Alternatives

CEQ Regulations (40 CFR 1502.14) require that a reasonable range of alternatives be proposed and the effects of implementing those actions be evaluated. A range of alternatives was obtained by combining various intensities of salvage and late-successional forest restoration projects into alternatives.

By combining six approaches to economic recovery of fire-killed trees (salvage) with four intensity levels for restoration projects, six action alternatives were developed. The six action alternatives, plus the No Action Alternative, resulted in a total of seven different alternatives. Variations between the action alternatives focus primarily on the intensity of treatments rather than the types of treatments.

Options are also presented for reforestation consistent with overall restoration intensity levels. Alternatives A and E follow the ESRP reforestation guidelines. Alternatives B, C, D, and G more closely follow LSR objectives as opposed to reforestation on Matrix lands; i.e. fewer follow-up silviculture treatments, and greater species diversity. Alternative F follows the report from Beschta, et al.

Proposed restoration projects were derived from the South Cascades LSRA, the Elk Creek WA, or developed during preparation of this EIS.

The alternatives for area salvage range from no salvage (Alternatives A and B) to highest level of salvage in Alternative E. Salvage guidance from the NFP for LSRs states "Levels will be 'typical' and will not require retention of all material where it is highly concentrated, or too small to contribute to coarse woody debris over the long timeframes discussed." (USDA and USDI 1994b, C-15). However, the NFP does not define "typical" levels. The No Action Alternative (no salvage) and guidance from the report by Beschta, et al. provide very conservative approaches to salvage in an LSR. The South Cascades LSRA defines typical levels of snags and CWD using a different conservative approach (USDI and USDA 1998, 173).

Another level of possible salvage is proposed using an advisory system (from the LSR Working Group) called "DecAID." A maximum level of salvage is proposed using a higher level or snags and CWD retention than required on Matrix lands. This is lower than what is recommended in LSRA guidance. Finally, in response to numerous questions raised about salvage, a "research alternative" was developed through coordination with a group of Oregon State University (OSU) natural resource scientists. All of the salvage alternatives analyze a higher level of snags and CWD than found in guidelines from State of Oregon Forest Practices Act, which applies to private lands, or guidelines for Matrix lands from the NFP. Additional guidelines for developing salvage alternatives are described in Appendix D.

As stated in the LSRA, the approach presented for "area salvage" is a conservative approach to salvage (USDA and USDI 1998, 173). The report from Beschta, et al., represents the approach producing the least amount of salvage, other than no salvage. The decision maker would not have a reasonable range of alternatives from which to choose if guidelines from the South Cascades LSR Assessment were used as the maximum amount of salvage.

2.5.1 Alternatives Considered but Eliminated from Detailed Analysis

During the review of internal and public issues, and development of alternatives, several variations of alternatives were considered by the interdisciplinary team. Of the various alternatives considered, three alternatives were developed but eliminated from detailed study after closer assessment.

2.5.1.1 Roadside Hazard Tree Removal

The importance of public land user safety and the removal of hazard trees along open roads was discussed. The team decided it was not necessary to analyze removal of hazard trees as a stand-alone alternative. Therefore, this alternative was incorporated into all the action alternatives.

2.5.1.2 Do Not Delay Harvest of Dead Trees

Based on public comment, the BLM should proceed with the salvage of fire-killed trees. Many adjacent landowners in the Elk Creek Watershed proposed removing the fire-killed trees immediately in order to recover the value of what was burned and reduce the risk of another fire in the future. There would be less loss of salvageable material due to decay and reforestation efforts could begin sooner. BLM must use the required decision-making process, including preparation of an environmental document and public participation under NEPA for BLM-administered lands. Following these rules and regulations prevents the BLM from immediately implementing an alternative such as this. Therefore, this alternative was dropped from consideration.

2.5.1.3 Consideration of *Recommendations for Ecologically Sound Post-Fire Salvage Management and Other Post-fire Treatments on Federal Lands in the West* (Beschta, et al. 1995)

The recommendations in this report could not be totally implemented as written. To the extent possible, they were considered and applied in Alternative F. The

recommendation to leave all trees greater than 20" DBH was not adopted. Objectives of this EIS are economic recovery as well as LSR restoration. Due to decay, salvage of fire-killed trees 16" DBH or less is not economical in most cases after two years. After three years, these trees are basically unsalvageable. After five years, trees less than 28" DBH lose nearly 40 percent of volume and only the largest trees are consistently salvageable. Due to reduced harvest efficiency, the potential for economic benefit from timber salvage would be lost within 3 years for areas where trees less than 28" DBH are common. By the third year, reassessment of these areas would be required to determine the feasibility of salvage. Areas of consistently larger trees (28" DBH or greater) could remain salvageable for 10 to 15 years but volume losses from decay and drying would continue to occur.

Another recommendation from this report was to allow natural recovery. Human intervention should not be permitted unless and until it is determined that natural recovery process are not occurring. An Emergency Stabilization/Rehabilitation Plan (ESRP) was developed immediately after the fire. The ESRP recommended replanting the plantations burned at high severity. In spring 2003, 1,000 acres in old plantations were replanted. Therefore, these recommendations were not adopted in Alternative F.

2.6 Comparison of Alternatives

Table 2-1 presents in detail the levels of salvage and restoration treatments proposed. More detailed descriptions of the projects can be found in the alternative descriptions in this chapter or in Appendices D and E. Treatment measurements (acres/miles/etc.) are estimates for analytical purposes and actual treatments will vary.

2.7 Summary Comparison of the Effects of the Alternatives

Table 2-2 is a summary of the effects of implementing the alternatives. This summarizes effects on resources and illustrates how the alternatives meet project objectives.

2.8 Cumulative Effects Analysis Summary

Table 2-3 summarizes the important cumulative effects anticipated within the area. Cumulative effects analyses are particularly important in this EIS because of the effects of the wildfire, the anticipated effects of the proposed alternatives, the effects of actions on adjacent industrial forestlands, and the effects of other reasonably foreseeable future actions within the geographic area.

2.9 Stand-Replacement Trends and Consequences

Table 2-4 projects the anticipated trends and consequences in salvaged and unsalvaged stand replacement areas. Stand-replacement areas are those areas where the fire resulted in less than 40 percent live canopy. The table shows the anticipated development of these stands in 15, 50, and 80 years and the predicted influences they would have on other resource values over time. It projects anticipated development of these stands towards meeting the LSRA Desired Future Conditions described in Appendix B and in Management Recommendations from the Elk Creek Watershed Analysis.

2.10 Trends and Consequences of Restoration Projects

Table 2-5 projects the anticipated trends and consequences of the proposed restoration projects. The table shows anticipated developments within the watershed in 5 and 50 years resulting from these proposed projects. It also shows predicted influences these projects would have on other resource values over time. It projects anticipated direction these projects would provide in meeting the LSRA Desired Future Conditions described in Appendix B and in Management Recommendations from the Elk Creek Watershed Analysis.

Table 2-1. Comparison of Alternatives

Proposed Projects	Alternative A No Action – Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta, et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Salvage							
Area Salvage							

Table 2-1. Comparison of Alternatives

Proposed Projects	Alternative A No Action – Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta, et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Salvage	• None	• None	• Salvage in high and moderate burn severity areas >10 acres • <40% canopy closure • Salvage no more than 20% of unit • Small patch clear cuts or group selection • No salvage in low and very low burn; riparian areas; patches <10 acres; within ¼ mile of active owl sites	• Salvage in high and moderate burn severity areas >10 acres • <40% canopy closure • Small patch clear cuts or group selection; openings <20 acres • No salvage in low and very low burn; riparian areas; within ¼ mile of active owl sites	• Salvage in high, moderate, low, and very low burn severity areas • No salvage in riparian areas	• Salvage 3-10 acre pockets of dead trees located in green stands • Leave minimum of 2 acres untouched within each pocket • No salvage in clumps of dead trees <3 acres or >10 acres, high and moderate burn severity areas, erosive sites, fragile soils, steep slopes, riparian areas, within ¼ mile of active owl sites	**In All Units:** • Salvage in high and moderate burn severity areas >10 acres • <40% canopy closure **Research units:** • Conduct salvage research in 12 units, ≥30 acres each • 3 treatment; 4 repetitions of each treatment ■ Intensive; Salvage entire unit (11 acres of riparian area could be salvaged) ■ Moderate; reserve 30% of unit ■ Control; no salvage **Outside research units:** • Salvage in patches <10 acres would occur in and adjacent to FMZ • No salvage in riparian areas • Small patch clear cuts or group selection; openings <20 acres

Snag and CWD retention levels			• 52 snags/acre in ABCO series • 29 snags/acre in PSME series • Retain pre-fire CWD and snags	• 17snags/acre and 6.7% ground cover in ABCO series • 8 snags/acre and 3.6% ground cover in PSME series • Retain pre-fire CWD and snags	**High and moderate burn area - 1,930 acres** • Leave 8 snags/acre PSME • 12 snags/acre ABCO • Leave minimum 120' CWD >16" and 16' per acre **Low burn area - 1,339 acres** • Leave 4 snags/acre • Leave minimum 120' CWD >16" and 16' per acre • Retain pre-fire CWD and snags	• Snags and CWD provided in unsalvaged areas	**Research units:** • Leave 6 snags/acre in salvaged portion • Leave minimum 120' CWD >16" and 16' per acre in salvaged portion **Outside research units:** • Leave 8 snags/acre and 2.0% ground cover in PSME • Leave 12 snags/acre and 3.6% ground cover in ABCO • Retain pre-fire CWD and snags
Harvest systems			• On 247 acres: ■ 123 acres cable ■ 21 acres tractor ■ 12 acres bull-line ■ 91 acres helicopter	• On 820 acres: ■ 368 acres cable ■ 112 acres tractor ■ 19 acres bull-line ■ 321 acres helicopter	• On 3,269 acres: ■ 853 acres cable ■ 165 acres tractor ■ 188 acres bull-line ■ 2,063 acres helicopter	• On 213 acres: ■ 46 acres cable ■ 29 acres tractor ■ 16 acres bull-line ■ 122 acres helicopter	**Research units** • On 282 acres: ■ 136 acres cable ■ 7 acres tractor ■ 139 acres helicopter **Outside research units** • On 679 acres: ■ 266 acres cable ■ 106 acres tractor ■ 35 acres bull-line ■ 272 acres helicopter

Table 2-1. Comparison of Alternatives

Proposed Projects	Alternative A No Action – Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta, et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Road construction			• 0.25 miles of temporary road • No new permanent roads	• 0.6 miles of temporary roads. • No new permanent roads	• 1.5 miles of temporary road • No new permanent roads	• No new temporary roads • No new permanent roads	• No new temporary roads in research units • 0.9 miles temporary roads outside • No new permanent roads
Roadside Salvage							
	• None • Hazard trees identified by adjacent landowners and contractors would be cut • Salvage only after additional NEPA	• None • Hazard trees identified by adjacent landowners and contractors would be cut • Salvage only after additional NEPA	• 1,078 acres bull-line • Salvage hazard trees along BLM roads • Hazard trees in riparian areas and owl activity centers with suitable habitat would not be salvaged unless felled within the road • Retain pre-fire CWD	• 1,064 acres bull-line • Salvage hazard trees along BLM roads • Hazard trees in riparian areas and owl activity centers with suitable habitat would not be salvaged unless felled within the road • Retain pre-fire CWD	• 536 acres bull-line • Salvage hazard trees along BLM roads • Hazard trees in riparian areas and owl activity centers with suitable habitat would not be salvaged unless felled within the road • Retain pre-fire CWD	• 1,182 acres bull-line • Salvage hazard trees along BLM roads • Hazard trees in riparian areas and owl activity centers with suitable habitat would not be salvaged unless felled within the road • Retain pre-fire CWD	• 1,188 acres bull-line • Salvage hazard trees along BLM roads • Hazard trees in riparian areas and within ¼ mile of active owl sites would not be salvaged unless felled within the road • Retain pre-fire CWD
Restoration							
Fish Habitat Improvement							
Culvert Replacement for Fish Passage		• Replace 4 culverts	• Replace 4 culverts	• Replace 4 culverts	• Replace 4 culverts	• Replace 4 culverts	• Replace 4 culverts

Fish Structures (8 miles)		• 3 rock weirs/ mile • Add gravel above each weir • Place 15 logs/ mile	• 5 rock weirs/mile • Add gravel above each weir • Place 20 logs/ mile	• 5 rock weirs/mile • Add gravel above each weir • Place 20 logs/mile	• 10 rock weirs/mile • Add gravel above each weir • Place 25 logs/mile	• 3 rock weirs/mile • Add gravel above each weir. • Place 25 logs/mile	• 5 rock weirs/mile • Add gravel above each weir • Place 20 logs/mile
Vegetation Treatments							
Late-Successional Forest Habitat Restoration • Stands 10-30 years old		• Thin 1,102 acres • Trees <8" DBH • With >40% canopy closure	• Thin 862 acres • Trees <8" DBH • With >70% canopy closure	• Thin 862 acres • Trees < 8" DBH • With >70% canopy closure	• Thin 1,102 acres • Trees < 8" DBH • With > 40% canopy closure	• None	• Thin 862 acres • Trees < 8" DBH • With > 70% canopy closure
Late-Successional Forest Habitat Restoration • Stands 30-80 years old			• Thin 466 acres • Trees <20" DBH • With >70% canopy closure • CWD retention level equals 5% ground cover • Harvest thinned trees in excess of CWD levels • Leave pre-fire snags and CWD • Harvest systems: ■ 93 acres tractor ■ 140 acres cable ■ 233 acres helicopter	• Thin 466 acres • Trees <20" DBH • With >70% canopy closure • CWD retention level equals 2% ground cover • Harvest thinned trees in excess of CWD levels • Leave pre-fire snags and CWD • Harvest systems: ■ 93 acres tractor ■ 140 acres cable ■ 233 acres helicopter	• Thin 876 acres • Trees <20" DBH • With >40% canopy closure • CWD retention level equals 2% ground cover • Harvest thinned trees in excess of CWD levels • Leave pre-fire snags and CWD • Harvest systems: ■ 219 acres tractor ■ 237 acres cable ■ 420 acres helicopter	• None	• Thin 466 acres • Trees <20" DBH • With >70% canopy closure • CWD retention level equals 2% ground cover • Harvest thinned trees in excess of CWD levels • Leave pre-fire snags and CWD • Harvest systems: ■ 93 acres tractor ■ 140 acres cable ■ 233 acres helicopter
Pine Restoration • Stands 10-30 years old with mixed pine		• Thin 156 acres • Trees <8" DBH	• Thin 16 acres • Trees <8" DBH	• Thin 16 acres • Trees <8" DBH	• Thin 156 acres • Trees <8" DBH	• None	• Thin 16 acres • Trees <8" DBH

Table 2-1. Comparison of Alternatives

Proposed Projects	Alternative A No Action – Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta, et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Pine Restoration • Stands 30-80 years old			• Thin 91 acres • Harvest thinned trees • CWD retention level equals 2% ground cover • Leave pre-fire snags and CWD	• Thin 91 acres • Harvest thinned trees • CWD retention level equals 2% ground cover • Leave pre-fire snags and CWD	• Thin 162 acres • Harvest thinned trees • CWD retention level equals 2% ground cover • Leave pre-fire snags and CWD	• None	• Thin 91 acres • Harvest thinned trees • CWD retention level equals 2% ground cover • Leave pre-fire snags and CWD
Pine Restoration • Stands 80+ years old			• Thin and clear around 686 acres of pines >24" DBH • Harvest cut trees • CWD retention level equals 2% ground cover • Leave pre-fire snags and CWD • Harvest Systems; ■ 79 acres tractor ■ 698 acres helicopter	• Thin and clear around 686 acres of pines >24" DBH • Harvest cut trees • CWD retention level equals 2% ground cover • Leave pre-fire snags and CWD • Harvest Systems: ■ 79 acres tractor ■ 698 acres helicopter	• Thin and clear around 1,687 acres of pines >24" DBH • Harvest cut trees • CWD retention level equals 2% ground cover • Leave pre-fire snags and CWD • Harvest Systems: ■ 203 acres tractor ■ 1,649 acres helicopter	• None	• Thin and clear around 686 acres of pines >24" DBH • Harvest cut trees • CWD retention level equals 2% ground cover • Leave pre-fire snags and CWD • Harvest Systems: ■ 79 acres tractor ■ 698 acres helicopter
Riparian Reserve Thinning • Stands 10-30 years old		• Thin 117 acres • Perennial streams • Trees <8" DBH	• Thin 225 acres • Perennial streams • Trees <8" DBH	• Thin 225 acres • Perennial streams • Trees <8" DBH	• Thin 437 acres • All streams • Trees <8" DBH	• None	• Thin 225 acres • Perennial streams • Trees <8" DBH

Riparian Reserve Thinning • Stands 30-80 years old			• Thin 134 acres • Trees <20" DBH • >40% canopy closure • Hand pile slash and girdle trees to limit fuel loads to 20 tons/acre or less	• Thin 134 acres • Trees <20" DBH • >40% canopy closure • Hand pile slash and girdle trees to limit fuel loads to 20 tons/acre or less	• Thin 613 acres • Trees <20" DBH • >40% canopy closure • Hand pile slash and girdle trees to limit fuel loads to 20 tons/acre or less	• None	• Thin 134 acres • Trees <20" DBH • >40% canopy closure • Hand pile slash and girdle trees to limit fuel loads to 20 tons/acre or less
Oak Woodland and Meadow		Thin 1,003 acres: • <8" DBH • Underburn	Thin 1,544 acres: • <8" DBH • Underburn	Thin 1,544 acres: • <8" DBH • Underburn	Thin 1,544 acres: • <8" DBH • Underburn	Thin 540 acres: • <8" DBH • Underburn	Thin 1,544 acres: • <8" DBH • Underburn

Table 2-1. Comparison of Alternatives

Proposed Projects	Alternative A No Action – Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta, et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Reforestation	• 6,000 acres • 10'x10' spacing • 430 tpa • Planting as analyzed in ESRP • Approximately 1,000 acres were planted as of November 2003	• 1,992 acres • Approximately 10'x10' spacing with microsite emphasis • 430 tpa • Replant if stocking level drops below 100 tpa • Mixed species • No mulching, tubing, or shading until replant • Remove brush around ½ seedlings	• 2,152 acres • Approximately 10'x10' spacing with microsite emphasis • 430 tpa • Replant if stocking level drops below 100 tpa • Mixed species • No mulching, tubing, or shading until replant • Remove brush around ½ the seedlings if stocking >250 tpa • Remove brush around all seedlings if stocking <250 tpa	• 2,152 acres • Approximately 10'x10' spacing with microsite emphasis • 430 tpa • Replant if stocking level drops below 100 tpa • Mixed species • No mulching, tubing, or shading until replant • Remove brush around ½ the seedlings if stocking is >250 tpa • Remove brush around all seedlings if stocking <250 tpa	• 6,000 acres • 10'x10' spacing • 430 tpa • Planting as analyzed in ESRP • Approximately 1,000 acres were planted as of November 2003	• 1,045 acres • Approximately 10'x10' spacing with microsite emphasis • 430 tpa • Plant only in riparian areas and slopes >65% • Reevaluate after 3 years and replant if natural regeneration is not occurring	• 2,152 acres • Approximately 10'x10' spacing with microsite emphasis • 430 tpa • Replant if stocking level drops below 100 tpa • Mixed species • No mulching, tubing, or shading until replant • Remove brush around ½ the seedlings if stocking is >250 tpa • Remove brush around all seedlings if stocking < 250 tpa **Research Planting** • 75-90 acres planted • Mixed species • Mixed planting densities • Varied vegetation treatment
Fuels Treatments							

Fuel Management Zones (FMZ)		• 1,300 acres: 500 acres within fire 800 acres outside • 400' outside LSR; 200' within LSR	• 1,300 acres: 500 acres within fire 800 acres outside • 400' outside LSR; 200' within LSR • FMZs within the fire includes salvage of patches <10 acres in size • Commercial thin 62 acres: 150' on each side of ridgeline in T33S, R1W, Sec. 14, 15	• 1,300 acres: 500 acres within fire 800 acres outside • 400' outside LSR; 200' within LSR • FMZs within the fire includes salvage of patches <10 acres in size • Commercial thin 62 acres: 150' on each side of ridgeline in T33S, R1W, Sec. 14, 15	• 1,300 acres: 500 acres within fire 800 acres outside • 400' outside LSR; 200' within LSR • FMZs within the fire includes salvage of patches <10 acres in size • Commercial thin 62 acres: 150' on each side of ridgeline in T33S, R1W, Sec. 14, 15	• 500 acres • 200' outside LSR; 200' within LSR • FMZs within the fire includes salvage of patches <10 acres in size	• 1,300 acres: 500 acres within fire 800 acres outside • 400'outside LSR; 200' within LSR. • FMZs within the fire includes salvage of patches <10 acres in size • Commercial thin 62 acres: 150' on each side of ridgeline in T33S, R1W, Sec. 14, 15
Fuels Treatments within Owl Activity Centers		• 425 acres within 4 owl activity centers	• 425 acres within 4 owl activity centers	• 425 acres within 4 owl activity centers	• 425 acres within 4 owl activity centers	• 300 acres within 3 owl activity centers	• 425 acres within 4 owl activity centers
Fuels Treatments within old West Branch Fire		• 70 acres	• 70 acres	• 70 acres	• 70 acres	• None	• 70 acres
Wildlife Projects							
Eagle Nesting Habitat		• Thin and clear around selected overstory trees on 50 acres	• Thin and clear around selected overstory trees on 50 acres	• Thin and clear around selected overstory trees on 50 acres	• Thin and clear around selected overstory trees on 50 acres	• None	• Thin and clear around selected overstory trees on 50 acres
Log Piles for Wildlife Habitat		• None	• 6 sites • Piles of logs 20'x20' and 4'-6' high	• 6 sites • Piles of logs 20'x20' and 4'-6' high	• 6 sites • Piles of logs 20'x20' and 4'-6' high	• 6 sites • Piles of logs 20'x20' and 4'-6' high	• 6 sites • Piles of logs 20'x20' and 4'-6' high
Road Projects							

Table 2-1. Comparison of Alternatives

Proposed Projects	Alternative A No Action – Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta, et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Reconstruction		• 2.6 miles • Add drainage structures and rock blankets	• 2.6 miles • Add drainage structures and rock blankets	• 2.6 miles • Add drainage structures and rock blankets	• 2.6 miles • Add drainage structures and rock blankets	• 2.6 miles • Add drainage structures and rock blankets	• 2.6 miles • Add drainage structures and rock blankets

Table 2-2. Summary of the Effects of the Alternatives

Proposed Projects	Alternative A No Action - Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta, et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Recovery of the Economic Value of Fire-Killed Trees (Salvage)							
Volume of salvage recovered	• None	• None	• 8.6 mmbf	• 21.0 mmbf	• 29.4mmbf	• 8.0mmbf	• 23.4mmbf
Revenue per mbf	• $0.0	• $0.0	• $225	• $209	• $184	• $229	• $204
Expected receipts from timber sale	• None	• None	• $1.9 million	• $4.4 million	• $5.4 million	• $1.8 million	• $4.8 million
Value of salvage to regional economy	• None	• None	• $7.4 million	• $18.1 million	• $25.2 million	• $6.9 million	• $20.1 million
Direct jobs from salvage	• None	• None	• 81	• 199	• 277	• 76	• 221
Total direct and indirect jobs to regional economy from salvage	• None	• None	• 130	• 318	• 443	• 121	• 354
Economic Value of Restoration Projects							
Direct and indirect jobs created from all restoration projects	• 122	• 146	• 215	• 215	• 325	• 84	• 215
Pine Release and LSR Thinnings							
Volume of harvest from vegetation treatments	• None	• None	• 2.5 mmbf	• 2.5 mmbf	• 5.5 mmbf	• None	• 2.5 mmbf
Cost of harvesting vegetation treatments	• None	• None	• $159,800	• $159,800	• $362,000	• None	• $159,800
Direct and indirect jobs created	• None	• None	• 38	• 38	• 83	• None	• 38

Table 2-2. Summary of the Effects of the Alternatives

Proposed Projects	Alternative A No Action - Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Road projects, reforestation, fuel management zones, fish structures, eagle nests, oak woodland treatments, and other restoration projects							
Cost of projects	• $3,400,000	• $5,200,000	• $5,900,000	• $5,900,000	• $8,400,000	• $2,800,000	• $5,900,000
Direct and indirect jobs created	• 122	• 142	• 161	• 161	• 232	• 78	• 161
Cost of Research							
Reforestation		• $0	• $0	• $0	• $0	• $0	• $415,600 over 6 years
Wildlife/snags		• $0	• $0	• $0	• $0	• $0	• $920,581 over 6 years
Fuel Loading Within the Elk Creek Watershed							
Acres of FMZs	• No reduction in fuel profiles	• 1,300 acres of fuel hazard reduction and fuel profile modification • Reduce fire intensity and size of future fires throughout LSR	• 1,300 acres of fuel hazard reduction and fuel profile modification • Reduce fire intensity and size of future fires throughout LSR	• 1,300 acres of fuel hazard reduction and fuel profile modification • Reduce fire intensity and size of future fires throughout LSR	• 1,300 acres of fuel hazard reduction and fuel profile modification • Reduce fire intensity and size of future fires throughout LSR	• 500 acres of fuel hazard reduction and fuel profile modification • Reduce fire intensity and size of future fires only within fire perimeter	• 1,300 acres of fuel hazard reduction and fuel profile modification • Reduce fire intensity and size of future fires throughout LSR
Protection to wildland urban interface and industrial forestland	• No additional protection to wildland urban interface and industrial forestland	• Reduce fire intensity and severity on 4,090 acres of hazardous fuels • Provides additional protection to 30,700 acres within WUI	• Reduce fire intensity and severity on 5,557 acres of hazardous fuels • Provides additional protection to 30,700 acres within WUI	• Reduce fire intensity and severity on 5,557 acres of hazardous fuels • Provides additional protection to 30,700 acres within WUI	• Reduce fire intensity and severity on 6,914 acres of hazardous fuels • Provides additional protection to 30,700 acres within WUI	• Reduce fire intensity and severity on 1,340 acres of hazardous fuels • Provides minimal protection to 30,700 acres within WUI	• Reduce fire intensity and severity on 5,557 acres of hazardous fuels • Provides additional protection to 30,700 acres within WUI

Protection to remaining LSR habitat	• No additional protection	• 3,088 acres of fuel hazard reduction and fuel profile modification	• 4,013 acres of fuel hazard reduction and fuel profile modification	• 4,013 acres of fuel hazard reduction and fuel profile modification	• 5,360 acres of fuel hazard reduction and fuel profile modification	• No treatment	• 4,013 acres of fuel hazard reduction and fuel profile modification
Underburning of oak woodlands and owl centers	• Continued encroachment to oak woodlands • Remains high fire hazard	• 1,428 acres of fuel hazard reduction and fuel profile modification	• 1,969 acres of fuel hazard reduction and fuel profile modification	• 1,969 acres of fuel hazard reduction and fuel profile modification	• 1,969 acres of fuel hazard reduction and fuel profile modification	• 840 acres of fuel hazard reduction and fuel profile modification	• 1,969 acres of fuel hazard reduction and fuel profile modification
Coarse Woody Debris (CWD) and Snags							
Estimated fire-killed trees (≥8" DBH) removed or retained in fire area	• Removed: 0 trees • Retained: 347,303 trees (100%)	• Removed: 0 trees • Retained: 347,303 trees (100%)	• Removed: 17,148 trees • Retained: 330,115 trees (95%)	• Removed: 42,529 trees • Retained: 304,774 trees (88%)	• Removed: 65,794 trees • Retained: 281,509 trees (81%)	• Removed: 15,481 trees • Retained: 331,822 trees (96%)	• Removed: 43,787 trees • Retained: 303,516 trees (87%)
Stand-replacement acres not salvaged	• 2,586 acres (100%).	• 2,586 acres (100%)	• 2,339 acres (90%)	• 1,766 acres (68%)	• 656 acres (25%)	• 2,373 acres (92%)	• 1,625 acres (63%)
Acceleration of Late-Successional Forest Habitat Characteristics							
Treatment of young stands	• No change • Slower development of late-successional habitat	• Accelerate development of late-successional habitat on 1,258 acres	• Accelerate development of late-successional habitat on 878 acres	• Accelerate development of late-successional habitat on 878 acres	• Accelerate development of late-successional habitat on 1,258 acres	• No change • Slower development of late-successional habitat	• Accelerate development of late-successional habitat on 878 acres.
Treatment of mid-seral stands	• No change. • Slower development of late-successional habitat	• Slower development of late-successional habitat	• Accelerate development of late-successional habitat on 557 acres	• Accelerate development of late-successional habitat on 557 acres	• Accelerate development of late-successional habitat on 1,038 acres	• No change • Slower development of late-successional habitat	• Accelerate development of late-successional habitat on 557 acres
Treatment of 80+ year old pine stands	• No change	• No change	• Increase resiliency to fire and maintain pine in late-successional stands on 686 acres	• Increase resiliency to fire and maintain pine in late-successional stands on 686 acres	• Increase resiliency to fire and maintain pine in late-successional stands on 1,749 acres	• No change	• Increase resiliency to fire and maintain pine in late-successional stands on 686 acres

Table 2-2. Summary of the Effects of the Alternatives

Proposed Projects	Alternative A No Action - Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Thinning and burning of oak woodlands and meadows	• No restoration • Areas continue to decline	• Increased vigor and resiliency of oak woodlands and meadows on 1,003 acres within fire perimeter • Continued decline outside of fire perimeter	• Increased vigor and resiliency of oak woodlands and meadows on 1,554 acres throughout LSR	• Increased vigor and resiliency of oak woodlands and meadows on 1,554 acres throughout LSR	• Increased vigor and resiliency of oak woodlands and meadows on 1,554 acres throughout LSR	• Increased vigor and resiliency of oak woodlands and meadows on 540 acres within fire perimeter • Continued decline outside of fire perimeter	• Increased vigor and resiliency of oak woodlands and meadows on 1,554 acres throughout LSR
Reforestation	• Maximum conifer establishment on 6,000 acres across fire area	• 3,016 acres planted • Expedite conifer establishment on high and moderate burn severity areas • More gap effect	• 2,152 acres planted • Expedite conifer establishment on high and moderate burn severity areas • More gap effect	• 2,152 acres planted • Expedite conifer establishment on high and moderate burn severity areas • More gap effect	• Maximum conifer establishment on 6,000 acres planted across fire area	• Reforestation only on most critical 1,045 acres • Remainder; no reforestation for 3 years and then reevaluate • Slowest development of late-successional forest	• 2,152 acres planted. • Expedite conifer establishment on high and moderate burn severity areas. • More gap effect. • Research to better understand reforestation effects
Riparian Reserve reforestation	• Maximize conifer establishment in Riparian Reserves	• Establish a more biologically diverse mix of riparian vegetation	• Establish a more biologically diverse mix of riparian vegetation	• Establish a more biologically diverse mix of riparian vegetation	• Maximize conifer establishment in Riparian Reserves	• Establish a more biologically diverse mix of riparian vegetation	• Establish a more biologically diverse mix of riparian vegetation

Riparian Reserve restoration thinning	• No treatments • Slower development of late-successional forest conditions	• Faster development of late-successional forest conditions on 117 acres treated • Girdling of trees provides a sustained pulse of snags/CWD	• Faster development of late-successional forest conditions on 359 acres • Girdling of trees provides a sustained pulse of snags/CWD	• Faster development of late-successional forest conditions on 359 acres • Girdling of trees provides a sustained pulse of snags/CWD	• Faster development of late-successional forest conditions on 1,050 acres • Girdling of trees provides a sustained pulse of snags/CWD	• No treatments. • Slower development of late-successional forest conditions	• Faster development of late-successional forest conditions on 359 acres • Girdling of trees provides a sustained pulse of snags/CWD
Road Density							
Road density within Elk Creek Watershed	• 4.7 miles per square mile	• 4.5 miles per square mile	• 4.4 miles per square mile	• 4.4 miles per square mile	• 4.3 miles per square mile	• 4.5 miles per square mile	• 4.4 miles per square mile
Road density on BLM-administered land	• 4.3 miles per square mile	• 3.4 miles per square mile.	• 3.4 miles per square mile	• 3.4 miles per square mile	• 3.1 miles per square mile	• 3.8 miles per square mile	• 3.4 miles per square mile
Percent decrease in BLM road miles	• None	• 23%	• 23%	• 23%	• 27%	• 10%	• 23%
Soils							
Erosion: Salvage effect primarily caused by type of logging system employed (% is area affected): • Tractor; 12% • Bull-line; 12% • Cable; 5% • Helicopter; 4%	• No effect	• No effect	• Increased sediment relative to acres salvaged and yarding system used: ■ Tractor 21 acres ■ Bull-line 1,090 acres ■ Cable 123 acres ■ Helicopter 91 acres	• Increased sediment relative to acres salvaged and yarding system used: ■ Tractor 112 acres ■ Bull-line 1,083 acres ■ Cable 368 acres ■ Helicopter 321 acres	• Increased sediment relative to acres salvaged and yarding system used: ■ Tractor 165 acres ■ Bull-line 724 acres ■ Cable 853 acres ■ Helicopter 2,063 acres	• Increased sediment relative to acres salvaged and yarding system used: ■ Tractor 29 acres ■ Bull-line 1,198 acres ■ Cable 46 acres ■ Helicopter 122 acres	• Increased sediment relative to acres salvaged and yarding system used: ■ Tractor 113 acres ■ Bull-line 1,223 acres ■ Cable 402 acres ■ Helicopter 411 acres
Soil compaction (12% of tractor-yarded acres)	• No effect	• No effect	• Increased compaction and soil displacement • Maximum compaction of 3 acres	• Increased compaction and soil displacement • Maximum compaction of 13 acres.	• Increased compaction and soil displacement • Maximum compaction of 20 acres	• Increased compaction and soil displacement • Maximum compaction of 4 acres	• Increased compaction and soil displacement • Maximum compaction of 14 acres

Table 2-2. Summary of the Effects of the Alternatives

Proposed Projects	Alternative A No Action - Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Soil productivity	• No effect	• No effect	• Slight long-term adverse from removing some organic matter from 1,325 acres	• Slight long-term adverse from removing some organic matter from 1,884 acres	• Slight long-term adverse from removing some organic matter from 3,805 acres	• Slight long-term adverse from removing some organic matter from 1,395 acres	• Slight long-term adverse from removing some organic matter from 2,149 acres
Delivery of Sediment to Streams							
Road decommissioning: reduces sediment delivery by 80-100% on treated road miles.	• No roads decommissioned • Continue existing erosion rates from roads.	• Potential short-term increase in delivery to streams followed by long-term reduction on 35 miles decommissioned • Return 144 acres to natural forest condition • Removal of 55 stream-crossings reduces annual road mass wasting rate by 3%	• Potential short-term increase in delivery to streams followed by long-term reduction on 35 miles decommissioned • Return 144 acres to natural forest condition • Removal of 133 stream-crossings reduces annual road mass wasting rate by 8%	• Potential short-term increase in delivery to streams followed by long-term reduction on 35 miles decommissioned • Return 144 acres to natural forest condition • Removal of 133 stream-crossings reduces annual road mass wasting rate by 8%	• Potential short-term increase in delivery to streams followed by long-term reduction on 43 miles decommissioned • Return 172 acres to natural forest condition • Removal of 148 stream-crossings reduces annual road mass wasting rate by 9%	• Potential short-term increase in delivery to streams followed by long-term reduction on 17 miles decommissioned • Return 68 acres to natural forest condition • Removal of 55 stream-crossings reduces annual road mass wasting rate by 3%	• Potential short-term increase in delivery to streams followed by long-term reduction on 35 miles decommissioned • Return 144 acres to natural forest condition • Removal of 133 stream-crossings reduces annual road mass wasting rate by 8%
Road maintenance: reduces sediment delivery by about 46% on treated road miles.	• Continued erosion rates from roads	• Treat 100 miles	• Treat 100 miles	• Treat 100 miles	• Treat 115 miles	• Treat 68 miles	• Treat 100 miles

Stream-crossing upgrades.	• No upgrades • 13% increase in annual road mass wasting rate	• Upgrade 15 high risk sites containing 11,000 yd^3 of sediment • 13% decrease in annual road mass wasting rate	• Upgrade 11 sites containing 8,000 yd^3 of sediment • 16% decrease in annual road mass wasting rat.	• Upgrade 11 sites containing 8,000 yd^3 of sediment • 16% decrease in annual road mass wasting rate	• Upgrade 26 sites containing 19,000 yd^3 of sediment • 22% decrease in annual road mass wasting rate	• Upgrade 26 high risk sites containing 19,000 yd^3 of sediment • 13% decrease in annual road mass wasting rate	• Upgrade 11 sites containing 8,000 yd^3 of sediment • 16% decrease in annual road mass wasting rate
Seasonal closures of 114 miles of road	• None	• None	• None	• None	• Reduce road damage and sediment delivery to streams	• None	• Reduce road damage and sediment delivery to streams
Threatened or Endangered Species							
Northern Spotted Owl							
Salvage: Assume occupancy in 11 sites (active sites)	• No change	• No change	• No salvage within ¼ mile • Enters 40 acres within ½-mile radius • Lowest risk of adverse impact	• No salvage within ¼ mile • Enters 8 sites; 111 acres within ½ mile • Low risk of adverse impacts	• Enters 9 sites; 219 acres within ¼ mile and 826 acres within ½ mile • Enters units <10 acres and areas with >40% canopy • Degrades suitable habitat • High risk of adverse impacts	• No salvage within ¼ mile • Enter 6 sites; 40 acres within ½ mile • Enters units <10 acres in size • Degrades suitable habitat • Moderate risk of adverse impacts	Research Units • Enters 3 sites; 49 acres within ¼ mile • Enters 4 sites; 138 acres within ½ mile Area Salvage: • No salvage within ¼ mile • Enters 10 sites: 169 acres within ½ mile • Moderate risk of adverse impacts

Table 2-2. Summary of the Effects of the Alternatives

Proposed Projects	Alternative A No Action - Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Salvage: Assume no occupancy in 8 sites (non-active)	• No change	• No change	• Enters 4 sites; 109 acres within ¼ mile • Enters 6 sites; 221 acres within ½ mile • Low risk of adverse effect	• Enters 4 sites; 125 acres within ¼ mile • Enters 9 sites; 314 acres within ½ mile • Low risk of adverse effect	• Enters 9 sites; 240 acres within ¼ mile • Enters 10 sites; 672 acres within ½ mile • Enters units <10 acres and areas with >40% canopy • Degrades suitable habitat • Highest risk of adverse effect	• Enters 5 sites; 24 acres within ¼ mile • Enters 8 sites; 70 acres within ½ mile • Enters units <10 acres in size • Degrades suitable habitat • Moderate risk of adverse effect	Research Units: • Enters 2 sites; 100 acres within ¼ mile • Enters 2 sites; 162 acres within ½ mile Area Salvage: • Enters 5 sites; 72 acres within ¼ mile • Enters 7 sites; 232 acres within ½ mile • Moderate risk of adverse effect

Restoration	• No beneficial effects from thinnings or habitat improvements • No adverse effect	**1,300 acre FMZ** • Low short-term adverse effect modifying suitable habitat • Moderate long-term benefit protecting habitat **Thinnings** • Accelerate development of late-successional habitat on 1,704 acres • Moderate long-term beneficial effect	**1,300 acre FMZ** • Low short-term adverse effect modifying suitable habitat. • Moderate long-term benefit protecting habitat. **Thinnings** • Accelerate development of late-successional habitat on 1,560 acres • Moderate long-term beneficial effect	**1,300 acre FMZ** • Low short-term adverse effect modifying suitable habitat • Moderate long-term benefit protecting habitat **Thinnings** • Accelerate development of late-successional habitat on 1,560 acres • Moderate long-term beneficial effect	**1,300 acre FMZ** • Low short-term adverse effect modifying suitable habitat • Moderate long-term benefit protecting habitat **Thinnings** • Accelerate development of late-successional habitat on 2,637 acres • Moderate long-term beneficial effect	**500 acre FMZ** • Inside fire, no short-term adverse effect modifying suitable habitat • Low long-term benefit protecting future habitat **Thinnings** • No beneficial effects from thinnings • No adverse effect	1,300 acre FMZ • Low short-term adverse effect modifying suitable habitat • Moderate long-term benefit protecting habitat **Thinnings** • Accelerate development of late-successional habitat on 1,560 acres • Moderate long-term beneficial effect
American Bald Eagle							
Restoration: Eagle nesting habitat projects	• No change	• Future nesting habitat established at 2 sites (50 acres) • Could contribute to delisting	• Future nesting habitat established at 2 sites (50 acres) • Could contribute to delisting	• Future nesting habitat established at 2 sites (50 acres) • Could contribute to delisting	• Future nesting habitat established at 2 sites (50 acres) • Could contribute to delisting	• No change	• Future nesting habitat established at 2 sites (50 acres) • Could contribute to delisting
Coho Salmon							
Salvage	• No salvage, no effect	• No salvage, no effect	• Insignificant/ discernible effect to fish and fish populations • May affect, NLAA	• Insignificant/ discernible effect to fish and fish populations • May affect, NLAA	• Insignificant/ discernible effect to fish and fish populations • May affect, NLAA	• Insignificant/ discernible effect to fish and fish populations • May affect, NLAA	• Insignificant/ discernible effect to fish and fish populations • May affect, NLAA

Table 2-2. Summary of the Effects of the Alternatives

Proposed Projects	Alternative A No Action - Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Restoration	• No change; Substantial adverse effects • May affect, LAA	• Short-term adverse and low long-term beneficial effect • May affect, NLAA	• Short-term adverse and moderate long-term beneficial effect • May affect, NLAA	• Short-term adverse and moderate long-term beneficial effect • May affect, NLAA	• Short-term adverse and substantial long-term beneficial effect • May affect, NLAA	• Short-term adverse and moderate long-term beneficial effect • May affect, NLAA	• Short-term adverse and moderate long-term beneficial effect • May affect, NLAA
Sensitive Species							
Cavity nesters: Salvage	• No change	• No change	• Negligible impacts (80-100% of snags remain)	• Very low impacts (manage for 80% and 50% tolerance levels)	• Moderate impact; highest number of snags removed	• Low impact (<2 acre patches and all burn outside green patches remain)	• Low impact (patches <10 acres 100% snags remain; 8-12 snags/acre left in treated acres)
Late-Successional habitat associated species: Salvage	• No impacts	• No impacts	• Negligible effects to late-successional habitat	• Negligible effects to late-successional habitat	• Low to moderate effects due to adverse impact to late-successional stand development	• Low due to adverse impact to late-successional stand development	• Negligible effects to late-successional habitat

Late-Successional habitat associated species: Restoration	• No change	• Slower development of late-successional habitat • Low effects to species that would use dense understory in FMZs	• Low short-term disturbance during activity • Long-term benefit to species that use high canopy and open understory • Low effects to species that would use dense understory in FMZs	• Low short-term disturbance during activity • Long-term benefit to species that use high canopy and open understory • Low effects to species that would use dense understory in FMZs	• Low short-term disturbance during activity • High benefit to habitat development • Low effects to species that would use dense understory in FMZs	• Slower development of late-successional habitat • Low effects to species that would use dense understory in FMZs	• Low short-term disturbance during activity • Long-term benefit to species that use high canopy and open understory • Low effects to species that would use dense understory in FMZs
Big game: road restoration projects	• No change in road density	• Potential increase in winter vehicle traffic from road restoration • Decommission and closure of 35 miles of road reduces poaching and disturbance	• Potential increase in winter vehicle traffic from road restoration • Decommission and closure of 35 miles of road reduces poaching and disturbance	• Potential increase in winter vehicle traffic from road restoration • Decommission and closure of 35 miles of road reduces poaching and disturbance	• Potential increase in winter vehicle traffic from road restoration • Decommission and closure of 43 miles of road reduces poaching and disturbance • Reduces poaching and disturbance by seasonally closing 114 miles of road	• Potential increase in winter vehicle traffic from road restoration • Decommission and closure of 17 miles of road reduces poaching and disturbance	• Potential increase in winter vehicle traffic from road restoration • Decommission and closure of 35 miles of road reduces poaching and disturbance • Reduces poaching and disturbance by seasonally closing 114 miles of road
Special Status and Survey and Manage Plants (vascular and nonvascular)							
Salvage	• No change	• No change	• Slight negative effect from tractor harvest and temporary roads	• Low adverse effect from tractor harvest and temporary roads	• Moderate adverse effect from tractor harvest and temporary roads	• Very slight negative effect from tractor harvest. No roads	• Low negative effect from tractor harvest and temporary roads

Table 2-2. Summary of the Effects of the Alternatives

Proposed Projects	Alternative A No Action - Continuation of Current Management	Alternative B No Salvage; Focused Restoration	Alternative C LSRA Salvage; Moderate Restoration	Alternative D LSR Salvage with DecAID; Moderate Restoration	Alternative E High Salvage; Extensive Restoration	Alternative F Salvage based on Report by Beschta et al.; Focused Restoration in Fire Area Only	Alternative G Salvage based on Research; Moderate Restoration
Restoration	• No benefits from habitat enhancement projects	• Low beneficial effects from habitat enhancement and fuels reduction projects	• Moderate beneficial effects from habitat enhancement and fuels reduction projects • Slight negative impact from tractor harvest	• Moderate beneficial effects from habitat enhancement and fuels reduction projects • Low negative impact from tractor harvest	• High beneficial effects from habitat enhancement and fuels reduction projects • Moderate negative impact from tractor harvest	• Low beneficial effects from habitat enhancement and fuels reduction projects	• Moderate beneficial effects from habitat enhancement and fuels reduction projects • Low negative impact from tractor harvest
Insect Outbreak							
Salvage	• Wood borer; moderate to high increase • Bark beetle; low to moderate increase	• No change	• No noticeable change	• Wood borer; very slight decrease • Bark beetle: very slight decrease	• Wood borer: slight to moderate decrease • Bark beetle: slight decrease	• No noticeable change	• Wood borer: slight decrease • Bark beetle: slight decrease
Restoration	• Wood borer: no change • Bark beetle: slight increase	• No change	• Wood borer: very slight increase • Bark beetle: very slight increase	• Wood borer: very slight increase • Bark beetle: very slight increase	• Wood borer: slight increase • Bark beetle: low to moderate increase	• No change	• Wood borer: very slight increase • Bark beetle: very slight increase
Noxious Weeds Populations							
Salvage	• No increased risk of invasion	• No increased risk of invasion	• Increased risk of noxious weed establishment relative to disturbance and harvest systems	• Increased risk of noxious weed establishment relative to disturbance and harvest systems	• Increased risk of noxious weed establishment relative to disturbance and harvest systems	• Increased risk of noxious weed establishment relative to disturbance and harvest systems	• Increased risk of noxious weed establishment relative to disturbance and harvest systems

Restoration		• Increased risk of noxious weed establishment relative to disturbance	• Increased risk of noxious weed establishment relative to disturbance	•Increased risk of noxious weed establishment relative to disturbance	• Increased risk of noxious weed establishment relative to disturbance	• Increased risk of noxious weed establishment relative to disturbance	• Increased risk of noxious weed establishment relative to disturbance
Public Safety							
Road side hazard tree removal	• Potential hazards removed when identified • Higher risk to public	• Potential hazards removed when identified • Higher risk to public	• Potential hazard trees cut reduces risk to public	• Potential hazard trees cut reduces risk to public	• Potential hazard trees cut reduces risk to public	• Potential hazard trees cut reduces risk to public	• Potential hazard trees cut reduces risk to public
Total area within fire perimeter with lower snag levels	• 22%	• 22%	• 24%	• 29%	• 49%	• 23%	• 33%
Consistency of Actions with NFP/RMP/LSRA							
Salvage: Consistency concerns related to • 10-acre rule • Salvage in areas with greater than 40% canopy • Snags and CWD requirements • Acres treated • Research	• No salvage	• No salvage	• Consistent with NFP, RMP, and LSRA with exemption for acres salvaged	• Consistent with NFP, RMP, and LSRA with exemption for acres salvaged	• Not consistent with NFP, RMP, or LSRA • Plan amendment required for: ■ Salvage in stands with >40% canopy ■ Salvage stands <10 acres in size	• Not consistent with NFP, RMP, or LSRA • Plan amendment required for: ■ Salvage stands <10 acres in size	• Research consistent with NFP • Consistent with NFP, RMP, and LSRA with exemption for acres salvaged
Restoration: Consistency concerns related to • FMZs • Late-successional habitat enhancement • Acres treated	• Reforestation consistent with NFP and RMP	• Treatments consistent with LSRA guidelines for FMZs and late-successional habitat enhancement • Consistent with NFP, RMP, and LSRA with exemption for acres treated	• Treatments consistent with LSRA guidelines for FMZs and late-successional habitat enhancement • Consistent with NFP, RMP, and LSRA with exemption for acres treated	• Treatments consistent with LSRA guidelines for FMZs and late-successional habitat enhancement • Consistent with NFP, RMP, and LSRA with exemption for acres treated	• Treatments consistent with LSRA guidelines for FMZs and late-successional habitat enhancement • Consistent with NFP, RMP, and LSRA with exemption for acres treated	• Treatments consistent with LSRA guidelines for FMZs and late-successional habitat enhancement	• Treatments consistent with LSRA guidelines for FMZs and late-successional habitat enhancement • Consistent with NFP, RMP, and LSRA with REO exemption for acres treated

Table 2-3. Cumulative Effects Analysis Summary

Issue	Past Actions	Timbered Rock Fire and Fire Suppression Actions	Proposed Actions Under the Preferred Alternative	Reasonable Foreseeable Future Actions	Cumulative Effects
Timber Management	• Checkerboard ownership pattern creates mosaic of seral stages • Both industrial and public lands managed for timber production • Numerous roads built to facilitate timber management • Last timber sale on public lands was in late 1980s • Public lands designated an LSR in 1994 and management focus switched to protecting or accelerating LSOG forest conditions	• Fire returned areas of high and moderate burn severity to early seral. • Areas burned with low or very low severity will return to pre-fire conditions within 2-10 years	• Public lands administered by BLM (and USFS) managed for late-successional forest conditions consistent with NFP and Medford District RMP	• Industrial forestlands managed intensively at short rotations (approximately 80 years) • Public lands administered by BLM and FS managed to protect and/or enhance late-successional forest conditions within the Elk Creek Watershed	• In the long-term, public lands managed by BLM and FS provide for late-successional forest conditions • Interspersed with BLM-administered lands are young and mid-seral forest stands on industrial forestlands • Public lands in adjacent forest watersheds managed as Matrix, emphasis on timber production
Salvage	• Actions taken consistent with past management direction, leaving fewer snags or CWD compared to existing direction	• N/A	• Salvage actions undertaken consistent with established LSR guidelines	• Industrial forestlands salvaged consistent with OFPA guidelines	• Salvage actions undertaken consistent with established LSR guidelines • Industrial forestlands salvaged consistent with OFPA guidelines

Wildfires	• Fire suppression began about 1910 • Large fires include: 1910 Buzzard Rock Fire 1910 Needle Rock Fire 1971 Elk Horn Peak Fire 1972 West Branch Fire 1987 Burnt Peak Fire 2002 Timbered Rock Fire • Fuels treatments have started within the watershed • Numerous small fires occurred and were suppressed • Fire exclusion has increased biomass	• Fire reduced fuel loadings for the short-term within fire perimeter • Outside fire perimeter, fuel loading remains high	• Fuels treatments would reduce fuel loadings • Proposed fuels treatments could potentially reduce large fire size into 5,000- to 7,000-acre blocks • Existing fuels treatments would be expanded outside fire perimeter	• Wildfires continue to occur • Aggressive fire suppression will continue to occur based on proximity to private land • Maintain fuels treatments to reduce flammability	• Potential for major reburn will exist after 15 to 20 years • FMZs and thinnings would increase fire fighter safety and enhance control efforts • Short-term, fuel conditions are present for large fires to occur given favorable weather conditions • Long-term, probability for large fires to occur would decrease • Increased protection to Wildland Urban Interface
Reforestation	• Approximately 5,400 acres of conifer plantations (10-40 years old) exist on BLM-administered land within the watershed	• Most of the 1,800 acres of plantations within the fire were burned with the majority of the trees killed	• Plant approximately 3,100 acres of BLM-administered land burned at high or moderate severity with mixed species • On BLM-administered land, replanting would not take place unless stocking levels fall below 100 tpa • Competing vegetation would be treated if stocking levels on all planted conifers fell below 250 tpa	• On industrial forest land, planting conifers and use of herbicides would occur on most of the harvested areas consistent with OFPA	• Seed from cones on fire-killed trees and adjacent live trees would help regenerate conifers • Fire-scorched hardwoods would reprout • Stocking levels >100 tpa would be reestablished on about 3,100 acres of BLM-administered land • Fire-killed openings <5 acres and low/very low burn severity areas would rely on natural seedling regeneration • Shrub component would likely be higher than past plantations

Table 2-3. Cumulative Effects Analysis Summary

Issue	Past Actions	Timbered Rock Fire and Fire Suppression Actions	Proposed Actions Under the Preferred Alternative	Reasonable Foreseeable Future Actions	Cumulative Effects
CWD and Snags	• Exclusion of fire has allowed small diameter woody debris to increase • Some large diameter downed wood and snags have been removed in past harvest • Fire exclusion has altered natural decay processes	• Fire created more small diameter CWD than previously existed • Large diameter wood and snags was created by the fire	• Retains most small diameter trees killed in the fire • Retains 6 tpa in research units and 8-12 large diameter snags per acre outside of research units • Meets or exceeds snag and CWD retention levels suggested by DecAID Wood Advisor at 30% and 50% levels • In Riparian Reserves, loss of future CWD on 14 acres harvested in research units	• Harvest of up to 6,000 acres of private industrial forest land killed by the fire	• Reduction in CWD and snag levels on private timberland consistent with OFPA • Retention of snags and CWD on BLM-administered land consistent with levels suggested by DecAID Wood Advisor • Most fire-killed trees under 16" DBH not merchantable and retained
LSR Habitat	• Late-successional habitat replaced by early seral conditions due to past fires and human activities • Late-successional forest conditions beginning to return on public lands due to LSR designation	• Loss of late-successional forest conditions • Increased late-successional forest habitat fragmentation	• FMZs provide increased protection to remaining late-successional habitat, but reduce canopy cover • Thinnings and pine release accelerate development of late-successional forest conditions	• Management actions in adjacent watersheds and on BLM and FS Matrix lands reduce late-successional habitat • FMZs maintained with open understory • Late-successional habitat conditions improve in Riparian Reserves, owl cores, and in LSRs • Silvicultural treatments applied to young and mid-seral stands to accelerate late-successional forest conditions • Reforestation and snag retention would help produce future late-successional habitat	• Checkerboard ownership pattern continues fragmentation of LSR habitat on landscape basis • Adjacent watersheds provide late-successional habitat through Riparian Reserves and owl cores • Late-successional habitat conditions improve in the long-term within the Elk Creek LSR

Special Habitat: Riparian Vegetation	• More early and mid-seral riparian vegetation due to past timber harvest • Reduced species and structural diversity in plantations due to even-spaced planting and thinning • Fuels build-up due to fire exclusion	• Loss of some late-successional riparian vegetation • Minor amount of riparian vegetation cut along roads during fire suppression activities	• High burn severity riparian areas replanted with conifers and hardwoods • Late-successional characteristics accelerated in early and mid-seral riparian stands.	• Development of late-successional habitat accelerated in thinned Riparian Reserves • Planting accelerates tree establishment in riparian areas burned at high severity or impacted during fire suppression activities	• Riparian vegetation improved on BLM-administered land, but at watershed-level riparian vegetation may not be functioning at optimal conditions due to checkerboard ownership
Special Habitat: Oak Woodlands and Meadows	• Altered and loss of habitats due to past human activities • Fuel build up and loss of fire-dependent native vegetation due to fire exclusion	• Some increased risk of exotic plant invasion from fire suppression activities and in areas burned at high severity • Fuel loads reduced and fire reintroduced in oak woodlands and meadows within the fire perimeter	• Oak woodlands and meadows inside and outside the fire perimeter restored and maintained	• Oak woodlands and meadows maintained on BLM-administered land • Wildfires likely to continue	• Oak woodlands and meadows maintained and more fire-resilient on BLM-administered land
Special Status Plants	• Altered and loss of habitat and Special Status plant populations due to past human activities within this and adjacent watersheds	• Slight chance that Special Status plants impacted by fire suppression activities • Some Special Status plants possibly impacted in high and moderate burn severity areas • Decrease in habitat for late-successional associated species; increase for earlier seral species	• Special Status plant sites protected through pre-project surveys and protection measures • Some potential competition from increases in noxious weeds • Increased habitat diversity and accelerated late-successional conditions from habitat enhancement projects	• Continued logging and road building on private lands • Potential increase in noxious weeds	• Habitat diversity and suitability for Special Status plants increased on BLM-administered land due to natural recovery and habitat enhancement projects

Table 2-3. Cumulative Effects Analysis Summary

Issue	Past Actions	Timbered Rock Fire and Fire Suppression Actions	Proposed Actions Under the Preferred Alternative	Reasonable Foreseeable Future Actions	Cumulative Effects
Road Density	• Numerous roads created for agricultural, residential, and timber management purposes • High road density within watershed	• Slight increase resulting from opening old roads previously closed	• Road density decreases on BLM-administered land and within entire watershed • Seasonal closures minimize traffic during wet season	• Roads remain within Elk Creek valley bottom and major drainages • Numerous roads on BLM and industrial forestland either closed, improved, or decommissioned • Long-term maintenance decreases	• Decrease in total miles of roads • Decrease in miles of natural surface roads • Decrease in miles of roads within riparian areas • Long-term decrease as fewer roads needed for timber management on both public and industrial forestland
Soil	• Large increase in erosion over natural background rates • Recently decreased erosion rates with improved forest practices	• Soil disturbance from fire-line construction • Fire-related erosion greatly increased • Severe reduction in soil organisms in high burn severity areas	• Decreased road-related erosion • Moderate short-term increased erosion from salvage • Maximum 12 percent compaction and displacement from tractor-yarded acres • 144 acres returned to vegetation from decommissioned roads	• Decreased erosion as fire area revegetates	• Moderate short-term increase in erosion rates • Reduced soil productivity from loss of organic material due to fire and whole tree yarding • Slight long-term negative effect to soil productivity within fire area on BLM-administered land • Beneficial effect in areas underburned due to increased nutrient availability • Short-term benefit to productivity from immediate input of tops, limbs, and sawdust

Delivery of Sediment to Streams	• Increased over background levels due to road building and logging • Roads are the major source of sediment	• Due to the fire, measurable increase over pre-fire levels during first year, with levels tapering off each consecutive year as vegetation recovers	• Slight increase above existing condition from salvage and road-related projects • Large reduction of fine sediment delivery from some roads	• Road restoration actions on BLM-administered land would reduce sediment delivery • Seasonal road closures on public and industrial forestland would reduce sediment delivery	• Increased above background in short-term from road building, logging, fire, suppression, salvage, and restoration • Decreased in long-term from road improvements, decommissioning, and closure, but still above background levels
Stream Temperature	• Increased over background levels due to agriculture, logging, and road building	• Increased temperature from loss of some streamside canopy cover during fire	• Actions protect and maintain stream buffers	• Harvest on industrial forestland maintains stream buffers consistent with OFPA • Increased stream shading due to recovering riparian areas would reduce stream temperatures	• Increased above background level from past actions and wildfire • Pre-fire temperature levels reached in long-term after vegetation recovers
Mass Wasting	• Increased substantially over background levels due to road building, logging, and wildfires • Roads constructed on mid-slope in steep terrain have the greatest failure rates	• Greatly increased over next 10 years within fire perimeter • Steep uplands and mid-slope roads in the high and moderate burn severity areas are at the highest risk	• Focused restoration of at-risk roads would measurably reduce the incidence of mass wasting from roads on BLM lands • Reforestation would improve slope stability and reduce effects of mass wasting in the long-term	• Likely to be an equal or greater number of potential events within the fire on industrial forest land as on BLM-administered land • Treat some road fills to reduce delivery of sediment to streams	• Mass wasting from roads and uplands may decrease to pre-fire levels after 10+ years, however, could remain higher near roads due to reduced maintenance • Implementing the proposed road restoration action on BLM-administered lands would decrease incidence of mass wasting along roads
Coho Salmon	• Removal of large woody debris resulted in low habitat complexity and limited insect production	• Slight increase in LWD • Continued low habitat complexity	• Improved habitat complexity	• Improved habitat complexity	• Improved fish populations and habitat in the short-term • Substantial decrease of fine sediment in streams

Table 2-3. Cumulative Effects Analysis Summary

Issue	Past Actions	Timbered Rock Fire and Fire Suppression Actions	Proposed Actions Under the Preferred Alternative	Reasonable Foreseeable Future Actions	Cumulative Effects
Northern Spotted Owl	• Habitat on BLM and FS lands has been improving since LSR designation in 1994 • Owl populations slightly declining due to habitat alteration	• Major reduction in the amount of suitable habitat • Major reduction in the probability of successful nesting	• Unknown level of use of burned stands by spotted owls • Unknown level of risk from salvaging dead stands within ½ mile of historic activity centers • Salvage would not alter existing suitable habitat	• Harvest on intermingled industrial lands could have additional effects on foraging • Anticipate 11 of 13 sites active pre-fire will remain occupied	• Suitable habitat on Matrix lands in adjacent lands continues to be logged • Increase in suitable spotted owl habitat as LSR characteristics return over long period of time • Salvage on intermingled industrial lands could have additional effects • Owl cores and Riparian Reserves in adjacent watershed will provide connectivity between LSRs
Insect Outbreak	• Bark beetle and wood borer populations were at endemic levels prior to fire • Populations have been cyclical with localized outbreaks associated with drought, windthrow, and fire	• Increase in habitat for bark beetles, especially in fire-damaged trees • Increase in habitat for wood borers in fire-killed trees	• Increase in bark beetle populations due to retaining fire-damaged green trees • Increase in wood borer populations due to retention of fire-killed trees	• Fire-killed trees would be removed on approximately 6,000 acres of private industrial forest land reducing wood borer habitat on those acres.	• Bark beetle populations would rise in the first 2 years after the fire and likely infest adjacent green trees, but would be localized and decrease to more normal levels within 3-4 years • Wood borer populations would likely rise and remain higher than normal as long as downed trees remain sound

Spread of Noxious Weeds	• Occur along roads in forested areas	• Increase open areas and disturbance increases risk of invasion and spread	• Increased risk of noxious weed establishment relative to disturbance and harvest systems	• Increase risk of establishment offset by greater awareness and control measures	• Reduced risk of spread due to implementation of mitigating measures, PDFs, and increased public awareness of noxious weed problems • Reduced risk of spread due to reduced activities on LSR designated lands • Increased noxious weed treatments on private lands reduces potential for spread

Table 2-4 Stand-Replacement Trends and Consequences - Fire Effects

	15 Years		50 Years		80 years	
	Salvage Areas	**No Salvage Areas**	**Salvage Areas**	**No Salvage Areas**	**Salvage Areas**	**No Salvage Areas**
Vegetative Composition	• Conifers at 100-600 trees per acre (tpa) depending on planted seedling survival and natural seeding • Shrub and hardwood species intermixed with conifers in canopy. Lower portions of crowns becoming intermingled • Conifers 2-7" DBH • Increase in downed wood from retained fire-killed trees as they begin to fall • Treatment at 15 Years: PCT stands to retain optimum growth on conifers. Retain 80-200 tpa in conifers. Variable spaced residual trees with 1-2 acre unthinned patches. Hardwoods comprise up to 25% of stand. Select up to 25 tpa for removal of all competing vegetation within 5" of dripline	• Similar to salvaged areas • Greater increase in downed wood than salvaged areas • Potential increase in seedling survival on harsh sites and possible reduced seedling growth from dead shade on better sites • Potential for reduced growth on conifer seedlings if hazard trees restrict access for control of competing vegetation	• Brush growing increasingly decadent; conifers well above brush, 60-180 tpa in conifers; hardwoods as co-dominant and intermediate canopy level, comprise up to 20% of stand • Conifers 8-16" DBH; self pruning occurring; canopy closures 80-95%; stem exclusion stage with some suppressed trees dying • Treatment at 50 Years: Thin stand to maintain growth on residual trees; retain 60-120 tpa in conifers; residual trees should have crowns free to grow, with retention of some lower limbs, approximately 50% canopy closure of stand; retain up to 20% of stand in hardwoods; variable spaced residual trees with 1-2 acre unthinned patches	• Similar to salvaged areas • Greater increase in downed wood, as fewer snags remain standing • Potential benefit to growing trees from decomposition of downed wood, nutrient availability and associated organisms	• Conifers 10-24" DBH; canopy closures 70-90%; hardwoods as co-dominant or intermediate in canopy level up to 20% of stand • Loss of lower limbs in co-dominants, with greater crown retention in dominant conifers; height-to-live crown is increasing. • Majority of downed wood has decomposed (class 4 and 5) and few snags remain from fire. Downed wood helps maintain nutrient stocks and basic ecosystem processes • Treatment at 80 Years: Potential thin to favor dominant trees, retain greater percentage of crown on residual trees; retain 40-80 tpa; variable spacing	• Similar to salvaged areas • Greater amount of decomposed downed wood (class 4 and 5) and very few snags remain from fire

Primary Carrier of Fire	• Live brush and conifers • Light slash less than or equal to 3" in diameter	• Heavy dead and down fuels • Brush and conifers • Snags may play major role in fire spread	• Live, dead brush and conifers • Slash 3" or less in diameter decomposing and plays only minor role, if any	• Heavy dead and down fuels play role in fire intensity • Brush and conifers • Snags may play major role in fire spread	• Brush and conifers • Slash only plays role if created recently	• Dead and down play increasing role in fire intensity • Snags may play major role in fire spread • Brush role is decreasing
Consequence of Fire	• Low severity, slow-moving fire with little long-term damage • Small fires, unless wind-driven • Some conifer mortality occurs from torching	• Moderate severity fire • Long-term soil damage possible • Probable conifer mortality from torching	• Low to moderate severity fire • Brush is primary carrier of fire • Brush maturing and live-to-dead ratio is changing • Conifers will torch and play increasing role in fire behavior • Fires may move rapidly with wind • Direct attack would be feasible for most fires	• Moderate severity with patches of high severity • Deep soil heating will occur • Conifers will torch and play increasing role in fire behavior • Fires more likely to move rapidly with wind • Indirect attack would be preferred for firefighter safety; could lead to potentially larger fires	• Low to moderate severity fire • Brush is primary carrier of fire • Brush maturing and live-to-dead ratio is changing • Conifers will torch • Conifer role in fire behavior lessening in all but extreme fire conditions • Fires will move rapidly with wind • Direct attack would be feasible for most fires	• Moderate severity with patches of high severity increasing • Effects of soil heating increasing • Conifers will torch • Conifer role in fire behavior lessening in all but extreme fire conditions • Fires will move rapidly with wind • Indirect attack would be preferred for firefighter safety; could lead to potentially larger fires
Wildlife Habitat	• Not suitable for owl foraging; too brushy and dense for access to woodrat prey	• Not suitable for owl foraging; too brushy and dense for access to woodrat prey	• Becoming owl dispersal habitat • Becoming foraging habitat if thinned	• Becoming owl dispersal habitat • Becoming foraging habitat if thinned	• Now owl foraging habitat; becoming marginal nesting habitat if structure is patchy and some old snags persist	• Now owl foraging habitat; becoming marginal nesting habitat if structure is patchy and some old snags persist

Table 2-4 Stand-Replacement Trends and Consequences - Fire Effects

	15 Years		50 Years		80 years	
	Salvage Areas	**No Salvage Areas**	**Salvage Areas**	**No Salvage Areas**	**Salvage Areas**	**No Salvage Areas**
Fisheries Habitat/ Populations	• LWD amounts maintained and beginning to increase in streams • Habitat connectivity is high • Insect and fish abundance is moderate to low • Habitat complexity is low	• Same as salvaged areas	• Moderate to high amounts of LWD in streams • Habitat connectivity is high • Insect and fish abundance is moderate to high • Habitat complexity is moderate to high	• Same as salvaged areas	• Moderate to high amounts of LWD in streams • Habitat connectivity is high • Insect and fish abundance is moderate to high • Habitat complexity is moderate to high • Begin recruitment of LWD from new stand	• Same as salvaged areas
Water Quality/ Quantity	• Sedimentation rates at pre-fire levels • Stream temperature declines as canopy begins to close • LWD levels maintained and begin to increase due to fire-killed trees • Quantity: hydrologically immature; increased runoff compared to pre-fire	• Similar to salvage due to Riparian Reserves	• Some streams at pre-fire temperatures based on canopy closure • LWD levels increase greatly due to fallen snags • Quantity: hydrologically intermediate; runoff returning	• Similar to salvage due to Riparian Reserves	• Stream shade at potential and stream temperature is at potential • New source of LWD begins to establish from large conifers • Quantity: hydrologically mature; runoff at pre-fire	• Similar to salvage due to Riparian Reserves

Special Status Plants	• Special Status vascular plants not killed during the fire have recovered • Conifer stands are early seral; conditions favor earlier seral Special Status species • Special Status lichens, bryophytes, and fungi re-establishment is minimal on rocks, soil, and resprouted hardwoods	• Similar to salvaged areas • More downed wood that may benefit development of Special Status fungi component associated with downed and decaying wood, or lichens and bryophytes that utilize snags and CWD for substrate	• Conifer stands in mid-seral condition which benefits some Special Status species • Some Special Status population boundaries beginning to increase. • Special Status lichens and bryophytes associated with conifers begin to recolonize 50 year old trees • Shade-intolerant species may be shaded out by dense canopy cover, although PCT and natural mortality create openings that provide suitable habitat for those species	• Similar to salvaged area • More downed woody material present which would benefit species associated with decaying wood	• Late seral characteristics beginning to develop and benefit later seral Special Status species • Special Status lichens, bryophytes, and fungi associated with later seral habitat becoming established • Natural mortality and blowdown create canopy gaps that provide suitable habitat for earlier seral Special Status species, although populations under high canopy cover may decline	• Similar to salvaged areas

Table 2-4 Stand-Replacement Trends and Consequences - Fire Effects

	15 Years		50 Years		80 years	
	Salvage Areas	**No Salvage Areas**	**Salvage Areas**	**No Salvage Areas**	**Salvage Areas**	**No Salvage Areas**
Riparian Reserves	• Conifers at 100-600 tpa, depending on planted seedling survival and natural seeding • Shrub and hardwood species intermixed with conifers in canopy; lower portions of crowns becoming intermingled • Conifers 2-7" DBH • Increase in downed wood from retained fire-killed trees as they begin to fall • Treatment at 15 Years: PCT stands to retain optimum growth on conifers; retain 80-200 tpa in conifers; select up to 25 tpa for removal of all competing vegetation within 5" of dripline; retain hardwoods, unless in dripline of reserve conifers, and favor riparian species such as alder, ash, and big leaf maple	• Similar to salvaged areas • Potential increase in seedling survival on harsh sites; possible reduced seedling growth from dead shade on better sites • Potential for reduced growth on conifer seedlings if danger from snag numbers does not allow competing shrub treatment	• Brush growing increasingly decadent; conifers well above brush, 60-180 tpa in conifers; hardwoods, as co-dominant and intermediate canopy level, comprise up to 20% of stand • Conifers 8-16" DBH, self pruning occurring; canopy closures 80-95%; stem exclusion stage with some suppressed trees dying • Increase in downed wood, as fewer burned snags remain standing • Treatment at 50 Years: Select 12 dominant tpa and fall or girdle trees with crowns touching those trees	• Similar to salvaged areas • Greater increase in downed wood as fewer snags remain standing; potential benefit to growing trees from decomposition of downed wood, nutrient availability, and associated organisms • Increase in small diameter snags and downed wood (up to 10" DBH) from mortality of suppressed conifer and hardwood saplings in unthinned areas	• Conifers 10-20" DBH; dominant selected conifers from thinning 16-24" DBH; canopy closures 70-90% • Majority of downed wood has decomposed (class 4 and 5) and few snags remain from fire; downed wood helps maintain nutrient stocks and basic ecosystem processes	• Similar to salvaged areas • Greater amount of decomposed downed wood (class 4 and 5); few snags remain from fire
Soils	• Duff and litter approaching pre-fire condition • Wild fire would be of low to moderate severity • Mycorhizal community migrating into areas of high burn severity	• Duff and litter approaching pre-fire condition • Possibility of high severity fire • Mycorhizal community migrating into high burn severity areas	• Duff and litter at pre-fire condition • Wildfire would be low to moderate severity • Mycorhizal community migrating into high burn severity areas	• Duff and litter at pre-fire condition • High severity fire conditions • Mycorhizal community migrating into high burn severity areas	• Duff and litter at pre-fire condition • Wildfire would be low to moderate severity • Mycorhizal community reestablished high burn severity areas	• Duff and litter at pre-fire condition • High severity fire conditions • Mycorhizal community reestablished in high burn severity areas

Table 2- 5. Trends and Consequences of Restoration Projects

Late-Successional Forest Restoration	Pine Restoration	Riparian Reserve Thinning	Oak Woodland Restoration	Fuel Treatment Projects	Wildlife Projects	Fish Projects	Road Projects
Vegetative Composition							
5 Years							
10-30 year old stands: • Thinned to 100-200 conifers per acre (CPA), 4-7" DBH, tree canopies not touching, up to 25% of canopy in hardwoods, up to 25 TPA with competing vegetation removed **30-80 year old stands:** • Thinned to basal area of 120-140 ft^2, retaining 50% crown closure, up to 25% of canopy in hardwoods	**10-30 year old stands:** • Thinned to 100-200 CPA, favoring pines as residual species, 4-7" DBH, tree canopies not touching, up to 25% of canopy in hardwoods **30-80 year old stands:** • Thinned to basal area of 100-180 ft^2, up to 25% of canopy in hardwoods; pine species retained in residual stand **Large pine >20" DBH:** • Scattered large pine, 5-20 treated per acre; trees and shrubs removed within 20' of dripline of large residual pines • Pines planted or natural seeding occurring in these openings	**10-30 year old stands:** • Thinned to 100-200 CPA, 4-7" DBH, tree canopies not touching, up to 25% of canopy in hardwoods, and up to 25 CPA with competing vegetation removed **30-80 year old stands:** • 8-20" DBH, up to 12 dominant CPA (≈60' spacing) selected for treatment, competing trees with touching crowns girdled or felled	• Oaks and conifers will generally be 6" DBH or greater; spacing will vary but 20-50' spacing is desired. The intent is to restore a 15- to 20-year fire cycle within these sites	• 2-3 years after treatment expect vegetation resprouting in open stands • Closed canopy FMZs would have little vegetation regrowth • FMZs would model as fuel model 8. • FMZs in burn would have vegetation resprouting and require follow-up treatments to reduce unwanted vegetation • Flammability prior to treatment may model as fuel model 5 • In owl activity centers, vegetation would have recovered to a point where additional underburning or manual vegetation treatments are being considered or implemented	• N/A	• N/A	•Potential increase of tree production on 3.5 acre/$mile^2$ of decommissioned roads

Table 2- 5. Trends and Consequences of Restoration Projects

Late-Successional Forest Restoration	Pine Restoration	Riparian Reserve Thinning	Oak Woodland Restoration	Fuel Treatment Projects	Wildlife Projects	Fish Projects	Road Projects
50 Years							
10-30 yr old stands: 12-16" DBH • Stands dominated by Douglas-fir, up to 200 trees per acre (tpa) with incense cedar, sugar pine, madrone, and chinquapin present; ponderosa pine on southerly aspects; and white fir and big leaf maple on northerly aspects • Canopy closures 80-100%, with increase in small diameter snags and coarse woody debris (CWD) **30-80 yr old stands: 16-26" DBH** • Stands dominated by Douglas-fir up to 100 tpa, 200-280 ft^2 basal area with incense cedar, sugar pine, madrone, and chinquapin present; with ponderosa pine on southerly aspects; and white fir and big leaf maple on northerly aspects. • Canopy closures 80-100%, and increase in snags and CWD up to 16" DBH.	**10-30 yr old stands: 10-16" DBH** • Mix of ponderosa and sugar pine, incense cedar, Douglas-fir, and madrone, up to 200 tpa • Canopy closures 80-100% with increasing snags and CWD up to 10" DBH from mortality. **30-80 yr old stands: 14 -26" DBH** • Mix of ponderosa and sugar pine, incense cedar Douglas-fir, and madrone, up to 100 tpa, 200-260 ft^2 basal area • Canopy closures 80-100% with increasing numbers of snags and CWD up to 16" DBH from mortality **Large pine >20" DBH:** • Scattered large pines 24-40" DBH, 5-20 per acre, pine seedlings and saplings within openings around these pine • Mixed stand of ponderosa and sugar pine, incense cedar, Douglas-fir, and madrone, 8-26" DBH	**10-30 yr old stands: 12-16" DBH** • Stands dominated by Douglas-fir, up to 200 tpa with white fir, incense cedar, sugar pine, big leaf maple, madrone, and red alder present • Canopy closures 80-100%, with increase in small diameter snags and CWD **30-80 yr old stands: 14-26" DBH** • Stands with scattered dominant trees from release of the largest, 20-26" DBH • Stands dominated by Douglas-fir with incense cedar, white fir, big leaf maple, madrone, red alder present, 70-100% canopy closure and increase in small diameter snags and CWD	• There will be a mosaic of open low growing vegetation and pockets of mixed species and age classes of conifer and hardwood reproduction under existing overstory. • While brush pockets would appear, their age class and location would change as low intensity underburns occur across the site. These brush pockets would be consumed as their physiology makes them susceptible to prescribed fire	• Small patches of brush would reestablish. • In closed canopied FMZs, expect little change in overstory and minimal understory vegetation. These sites would represent fuel model 8. • Conifers would begin to assume dominance in FMZs within the burn. FMZs would be relatively free of brush from maintenance treatments. • In owl activity centers, there would be a mix of open low-growing vegetation and pockets of mixed species and age classes of conifer and hardwood reproduction under existing overstory following maintenance	• N/A	• N/A	• Potential increase of tree production on 3.5 $acre/mile^2$ of decommissioned roads

Fuel Loadings							
5 Years							
• If slash is treated, then stands would rate as fuel model 5 in all except extreme drought situations • If slash is untreated, then stand would rate as fuel model 11 to 12. Slash would provide heat necessary to move fire into crowns under even moderate burning conditions	• If slash is treated then stands would rate as fuel model 5 in all except extreme drought situations • If slash is untreated then stand will rate as fuel model 11 to 12. Slash would provide heat necessary to move fire into crowns under even moderate burning conditions	• Up to 25 tons per acre of boles left on site to start coarse wood recruitment. Tops and limbs piled and burned. Boles over 25 TPA to be piled and burned	• Reduced live/dead fuel loadings would contribute to reduced fire severities	• N/A	• N/A	• N/A	• N/A
50 Years							
• If slash is treated, stands would model as fuel model 8 with light ground fire • If slash is untreated, expect potential high intensity, high severity fires. Primary carrier of fire would be ground fuels with enough heat to move fire into crowns of overstory	• If slash is treated, stands would model as fuel model 8 with light ground fire. • If slash is untreated expect potential high intensity, high severity fires. Primary carrier of fire would be ground fuels with enough heat to move fire into crowns of overstory	• Up to 25 tons/acre of boles left on site to start coarse wood recruitment. Tops and limbs piled and burned. Boles over 25 tpa to be piled and burned or removed	• Continued reduced fire severities providing maintenance treatments completed	• N/A	• N/A	• N/A	• N/A

Table 2-5. Trends and Consequences of Restoration Projects

Table 2- 5. Trends and Consequences of Restoration Projects

Late-Successional Forest Restoration	Pine Restoration	Riparian Reserve Thinning	Oak Woodland Restoration	Fuel Treatment Projects	Wildlife Projects	Fish Projects	Road Projects
Wildlife Habitat							
5 Years							
• Slightly higher quality foraging habitat for owls • Improved foraging for goshawk and great gray owl • Habitat improved for birds that use open understory • Habitat reduced for birds that use brush and thickets	• Slightly higher quality foraging habitat for owls • Improve foraging for goshawk and great gray owl	• Slight increase in owl foraging quality • Slight decrease in fisher habitat in riparian from openings in understory	• Too open to provide quality owl foraging habitat • Habitat diversity will enhance diversity of prey species • Great gray owl and eagle foraging improved	• Ridgeline strips will remain owl foraging and dispersal habitat. • FMZs will increase the likelihood of maintaining more LSOG elsewhere in the watershed by helping to limit the spread of wildfires	• No effect to owls • 5 log piles available for use • No change in eagle habitat • Goshawk and great gray owl habitat improved with thinning	• N/A	• No direct effect on owl habitat • Increased habitat on decommissioned road segments (about 3.5 acre/mile^2) • Less disturbance to big game • Maintained roads enable fire-fighting access to protect LSOG • Relatively little snag structure removed in roadside salvage project
50 Years							
• Provides owl nesting habitat • Goshawk and great gray owl foraging and nesting habitat improved • Improved habitat for fisher due to large tree with defects and holes • Some large green trees beginning to develop structure for cavity nesters	• Due to hot south aspect, remains owl foraging habitat • Improved goshawk and great gray owl foraging and nesting habitat • Improved opportunities for nesting bald eagles	• Stands provide quality owl nesting and foraging • Higher canopy and larger trees improve fisher habitat in riparian reserves	• Too open to provide quality owl foraging habitat • Habitat diversity will enhance diversity of prey species • Increased foraging for great gray owl and eagles • Increased habitat for cavity nesters	• Ridgeline strips will remain owl foraging and dispersal habitat • FMZs will increase the likelihood of maintaining more LSOG elsewhere in the watershed by helping to limit the spread of wildfires	• No effect to owls • Log piles mostly decomposed • Large dominant trees with strong limbs suitable for eagle nests developing • Large nest trees for goshawk and great gray owl	• N/A	• No direct effect to owls habitat • Increased habitat on decommissioned road segments (about 3.5 acre/mile^2) • Less disturbance to big game • Maintained roads enable fire-fighting access to protect of LSOG • Relatively little snag structure removed in roadside salvage project

Fish Habitat							
5 Years							
• Decreased likelihood of catastrophic fires would maintain capability to recruit LWD to streams	• N/A	• Adds small diameter trees (<20" DBH) to stream to complement LWD >20" • Improves habitat complexity • Holds spawning gravels • Creates cover for fish • Yields low to moderate insect and fish abundance	• N/A	• Increased likelihood of Riparian Reserves contributing LWD to the stream	• N/A	• Culverts improve trout habitat connectivity • Spawning gravels collected behind logs and weirs increases fish production	• Decreased chronic erosion • Improved insect and fish abundance
50 Years							
• Decreased likelihood of catastrophic fires would maintain capability to recruit LWD to streams	• N/A	• Larger trees contribute to instream habitat structure	• N/A	• Increased likelihood of Riparian Reserves contributing LWD to streams	• N/A	• Riparian Reserves providing structure to maintain habitat and populations	• Negligible chronic erosion • Increased insect and fish population
Water Quality/Quantity							
5 Years							
• No change	• No change	• Maintain water quality and quantity	• No change	• Reduced risk of fires reduces risk of increased runoff and degraded water quality	• No change	• Increased stream channel stability maintains water quality	• Reduced sedimentation risk from reduced stream-crossing failures (11 sites) • Roadwork becoming stable by year five • Some reduction of sediment delivery due to reduced mass wasting along roads, depending on the intensity of restoration

Table 2-5. Trends and Consequences of Restoration Projects

Table 2- 5. Trends and Consequences of Restoration Projects

Late-Successional Forest Restoration	Pine Restoration	Riparian Reserve Thinning	Oak Woodland Restoration	Fuel Treatment Projects	Wildlife Projects	Fish Projects	Road Projects
50 Years							
• No change	• No change	• Increased growth in conifers within reserve provides increased canopy to maintain stream temperature • Increased LWD improving channel stability and water quality	• No change	• Reduced risk of fires reduces risk of increased runoff and degraded water quality	• No change	• Gravels have collected and stream channels have narrowed, improving stream temperature and water quality.	• Sediment reduced from road decommissioning and improvements • Quantity-Peak flows reduced due to increased cross drains and decommissioned roads • Channel network reduced by reducing road-related runoff • 23% reduction of potential sediment delivery due to reduced mass wasting along roads.
Special Status Plants							
5 Years							
• Canopy opened around select leave trees benefits earlier seral and shade-intolerant Special Status plant species	• Opened canopy benefits Special Status plants associated with open pine forest habitat • Special Status plants requiring more closed canopy conditions protected within no-treatment buffers	• More open conditions favor earlier seral, shade-intolerant Special Status plants	• Habitat conditions and reintroduction of fire favors maintenance and expansion of Special Status plant populations associated with oak woodlands	• Overall no changes to Special Status plant habitat, but may be some microsite openings that benefit shade-intolerant species • Underburning benefits species dependent on fire for regeneration • Habitat in FMZs in burn areas favorable for early seral species	• Overall no changes to Special Status plant habitat,; may be some microsite openings that benefit shade-intolerant species • Underburning benefits species dependent on fire for regeneration • Habitat in FMZs in burn areas favorable for early seral species	• No change	• No change

50 Years							
• Development of multi-species tree and shrub components will provide habitat for a diversity of Special Status plant species • Increased CWD and growth of large conifers will benefit Special Status fungi • More closed canopy cover will benefit shade-tolerant species, but shade-intolerant species may begin to decline	• Opened canopy benefits Special Status plants associated with open pine forest habitat • Special Status plants requiring more closed canopy conditions protected within no-treatment buffers	• Beginning development of late-successional characteristics benefits late-seral Special Status plant species	• Habitat conditions and reintroduction of fire favors maintenance and expansion of Special Status plant populations associated with oak woodlands	• Overall no changes to Special Status plant habitat • Habitat in FMZs in burn areas becoming more suitable for later-seral species. • Habitat diversity benefits Special Status plant species diversity	• Large pines provide substrate for Special Status lichens and bryophytes and mycorrhizal associations with Special Status fungi • No change from log piles	• No change	• No change
Riparian Habitat							
5 Years							
• Reduced wildfire hazard from reduction in suppressed ladder fuels	• Reduced wildfire hazard from reduction in suppressed ladder fuels	**10-30 yr old stands:** • Thinned to 100-220 CPA, 4-7" DBH, tree canopies not touching, up to 25% of canopy in hardwoods, and up to 25 CPA with competing vegetation removed **30-80 yr old stands:** • 8-20" DBH, up to 12 dominant CPA (≈60" spacing) selected for treatment, competing trees with touching crowns girdled or felled • Reduced wildfire hazard	• Reduced wildfire hazard from thinning around larger oaks and pine	•FMZs are generally on ridgetops and would not intercept riparian areas except along a few scattered edges • Canopy closure reduced but remains above 40% • Thinning would reduce wildfire hazard in these areas	• N/A	• Fish habitat improvement projects would use woody material from riparian areas but have little to no effect on terrestrial riparian habitat • In-stream riparian habitat would be enhanced by culvert replacement and large woody material in stream	• Decommissioning of 11.7 miles of road in riparian areas would improve the condition and functioning of riparian habitat through revegetation of those areas

Table 2- 5. Trends and Consequences of Restoration Projects

Late-Successional Forest Restoration	Pine Restoration	Riparian Reserve Thinning	Oak Woodland Restoration	Fuel Treatment Projects	Wildlife Projects	Fish Projects	Road Projects
50 Years							
• Reduced wildfire hazard from reduction in suppressed ladder fuels • Potential large wood from adjacent Late-Successional Reserves	• Reduced wildfire hazard from reduction in suppressed ladder fuels	**10-30 yr old stands: 12 -16" DBH** • Stands dominated by Douglas-fir, up to 200 tpa with white fir, incense cedar, sugar pine, big leaf maple, madrone, and red alder present • Canopy closures 80-100%, with increase in small diameter snags and CWD **30-80 yr old stands: 14 -26" DBH** • Stands with scattered dominant trees 20-26" DBH from release of the largest • Stands dominated by Douglas-fir with incense cedar, white fir, big leaf maple, madrone, red alder present, • 70-100% canopy closure and increase in small diameter snags and CWD • Reduced wildfire hazard	• Reduced wildfire hazard from thinning around larger oaks and pine • Increased growth on residual large pine and oaks with pockets of new growth of shrubs, hardwoods, and conifers after maintenance underburns	• Thinning in the FMZ would increase growth rates of residual confers • Canopy closures would remain above 40%, distance from ground fuels to crown would be increased, and ladder fuels reduced • Large conifers growing for future large woody material for streams	• N/A	• N/A	• N/A

Soils							
5 Years							
• Less risk of soil damage from reduced fire severity potential	• N/A	• N/A	• N/A	• Less risk of soil damage from reduced fire severity potential.	• N/A	• Short-term increase in erosion rates as a result of restoration-related disturbance	• Short-term increase in erosion rates as a result of restoration-related disturbance
50 Years							
• Less risk of soil damage from reduced fire severity potential	• N/A	• N/A	• N/A	• Less risk of soil damage from reduced fire severity potential	• NA	• Decreased road-related erosion rates to near background	• Decreased road-related erosion rates to near background on treated roads

Table 2-5. Trends and Consequences of Restoration Projects