

Chapter 2 - Alternatives, Including the Proposed Action

This chapter describes and compares the alternatives considered for the Traverse Creek Thin Project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, defining the differences between each alternative and providing a clear basis for choice among options by the decision maker. Some of the information used to compare the alternatives is based upon project design elements (such as acres of slash treatment by different methods and number of miles of road put into long-term storage) and upon the environmental, social and economic effects of implementing each alternative (number of log truck loads, logging cost per MBF, and present net values).

Alternative 1 – No Action

Alternative 1 is the no action alternative where the proposed project does not take place. No further activities would take place to manage the stands by thinning. The no action alternative provides a benchmark, or a point of reference for describing the environmental effects between Alternative 2 (proposed action) and Alternative 3.

Without treatment now, many of these stands would likely eventually develop into the desired structure as natural disturbances and competition-related mortality open up the stand and trigger the understory re-initiation stage of development. However, it is expected that this process would take substantially longer than under the proposed thinning regimes (Bailey and Tappeiner 1998). Thinning now would also broaden future management options by removing hazardous fuels and creating stands more resilient to disturbances (Poage 2001). This is especially true for the approximately 1,000 acres in the project area that have not been previously commercially or pre-commercially thinned.

No action would forgo the opportunity to harvest approximately 40 million board feet of timber that would be produced from these thinning prescriptions. A large portion of this timber would be in the form of trees that would die in the future from inter-tree competition.

Alternative 2 – Proposed Action

Alternative 2 is designed to implement the LRMP direction and meet standards and guidelines for the various forest resources. More specifically, Alternative 2 would:

- produce a sustainable supply of forest products according to LRMP direction (MA14a), which is the majority of this area,
- create biological diversity according to FW-201 of the LRMP, (USDA Forest Service 1990, p.IV-78)
- reduce open road density and increase big game foraging to improve big game habitat effectiveness (HE) according to FW-135 (ibid., p.IV-67).

This project area has over 2,900 acres of dense, even-aged, uniform, single-story, 35- to 60-year old plantations. This alternative is expected to yield approximately 40 million board feet of timber sawlogs to meet the purpose and need of maintaining the growth and health of the stands and producing a sustainable, commercial yield of wood products. The alternative uses a combination of ground-based, skyline and helicopter log-yarding systems with an emphasis on minimizing residual damage and disturbance.

In general, the trees in this project average 45 years of age, 14 inches in diameter, and 100 feet in height. Alternative 2 proposes to thin 2,564 acres. Moderate intensity thinning, leaving

generally 75 to 100 trees per acre, is prescribed for 2,144 acres. Heavy thinning, leaving about 50 trees per acre, is prescribed for 263 acres. Light thinning, generally leaving over 100 trees per acre is prescribed for 157 acres. Dominant-tree-release gaps up to an acre in size would occur on up to 385 acres (15 percent). Approximately 435 acres out of the original 3,000 acres considered for thinning would be left un-thinned. These include no-cut buffers along stream channels, areas with a large hardwood component, and areas with difficult access.

Log removal would be accomplished with a combination of yarding systems (see Figure 3 and Table 35 in Appendix E for treatment information for each harvest unit). Alternative 2 proposes the following combination of yarding systems:

- 1,004 acres of ground-based skidding
- 1,413 acres of skyline yarding
- 148 acres of helicopter yarding

The alternative would mitigate post-thinning fuels by yarding tops and branches on 2,408 acres and grapple piling along roads within treatment units on 120 acres. These proposed fuel treatments meet the purpose and need to manage fuel loadings within LRMP standards and guidelines.

Alternative 2 is designed to provide a high level of public access to the area by keeping most of the roads open. This alternative would implement only some of the proposed road closure in the Middle Fork District Supplemental Road Analysis. Most road closures would be of low cost and low intensity designs to store the roads in a hydrologically stable condition, but would allow for easy reopening. There would be about 4.5 miles of temporary road construction to access harvest units. Of this, approximately 1.0 mile would occur on existing old roadbeds.

Table 3. Summary of alternatives

	Unit of Measure	Alt.1	Alt. 2	Alt. 3
Timber Harvest				
Thinning Low Intensity	Acres	0	157	157
Thinning Moderate Intensity	Acres	0	2,144	2,144
Thinning High Intensity	Acres		263	263
Total Harvest Area	Acres	0	2,564	2,564
Gap area**	Acres	0	385	513
Estimated Timber Volume	MMBF	0	40	45
Logging Systems				
Ground-based	Acres	0	1,004	1,004
Skyline	Acres	0	1,413	1,413
Helicopter	Acres	0	148	148
Fuels Treatments				
Hand Pile and Burn	Acres	0	0	0
Grapple Pile/Burn along roads	Acres	0	120	40
Yard Tops Attached	Acres	0	2,408	2,092
Broadcast Burn	Acres	0	0	0
Total Fuels Treatments	Acres	0	2,450*	2,115*

*Notes: Acres of grapple pile/burn along roads and yarding tops have substantial overlap

** Gap area is not in addition to total harvest area. Gaps may be incorporated into any of the units regardless of thinning intensity and are part of the thinning intensity acres reported.

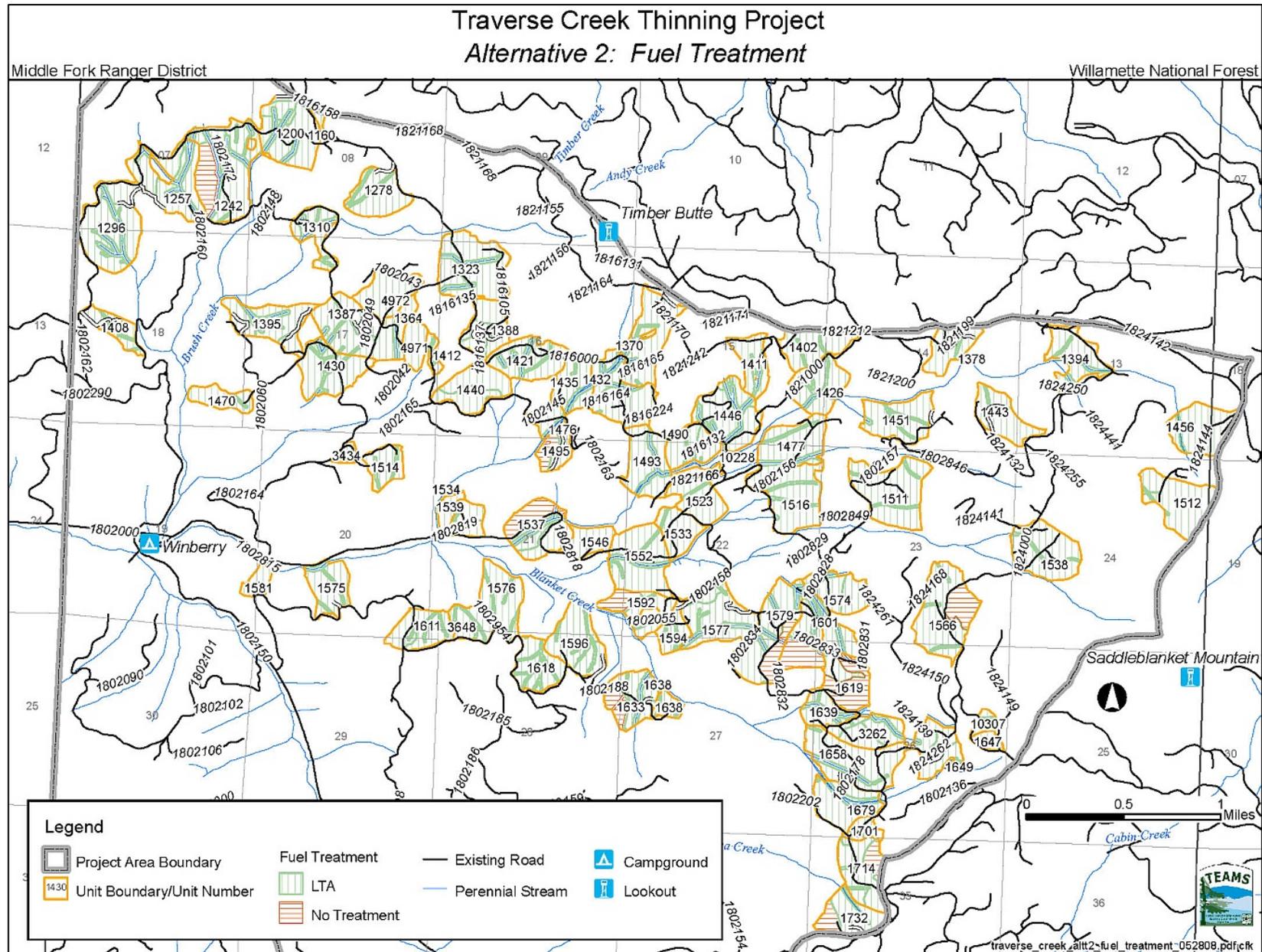


Figure 4. Proposed fuel treatments in Alternative 2 treatment units. LTA means leave tops attached so less fuel will be left on site

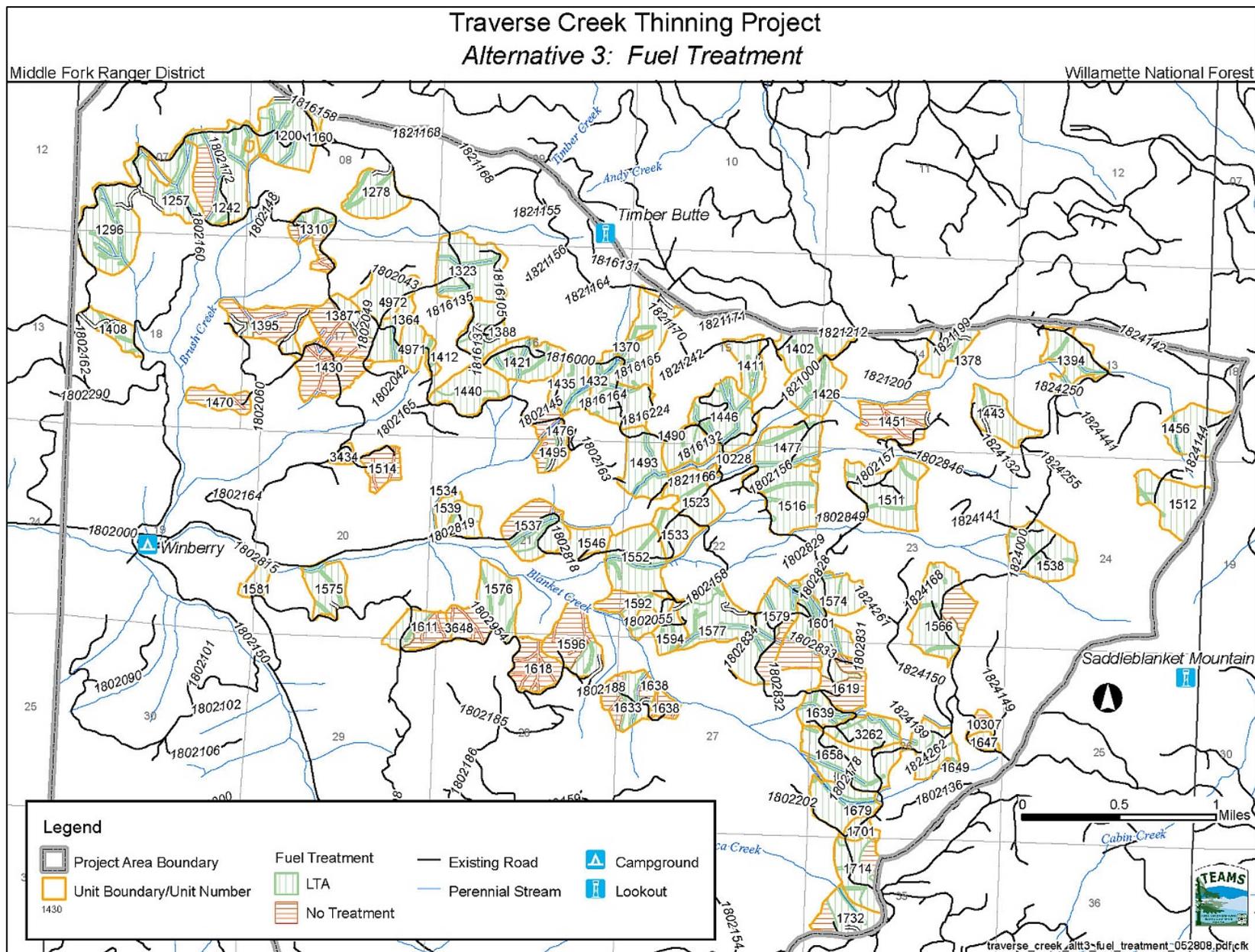


Figure 5. Proposed fuel treatments in Alternative 3 treatment units. LTA means leave tops attached so less fuel will be left on site

Road maintenance would occur on all haul routes which includes 66.8 miles of existing roads. The level of road maintenance will vary depending on the road segment (see Roads section in Chapter 3). Two perennial fish bearing stream crossing culverts under the main haul route Road 1802 would be replaced along with numerous other stream and ditch relief culverts during road maintenance activities. This alternative would close about 4.0 miles of roads by berming and/or gating; leaving the road prisms in a hydrologically stable condition. These road closures would meet the purpose and need to reduce open road densities and trend toward meeting standards and guidelines for big game habitat. All temporary roads constructed would be closed after completion of project activities.

Alternative 3

Alternative 3 proposes cost savings by lowering fuel treatment cost, road maintenance cost and eliminating closure of existing classified roads. Still, Alternative 3 would implement the LRMP direction and meet standards and guidelines for the various forest resources. Most notably:

- produce a sustainable supply of forest products according to LRMP direction (MA14a), which is the majority of this area,
- create biological diversity according to FW-201 of the LRMP,
- increase big game foraging to improve big game habitat effectiveness (HE) according to FW-135.

Alternative 3 has the same thinning treatments and logging systems as Alternative 2, but differs by having up to 513 acres (or 20 percent of the treatment unit area) in gaps, by reducing the amount of yarding tops on skyline units by 315 acres, and by reducing the amount of grapple piling along roads by 80 acres. Of the approximately 513 acres in gaps, 103 of these (20 percent) could be as large as three acres (see Table 35 in Appendix E for specific harvest and fuel treatments for each harvest unit).

Alternative 3 is designed to maintain access for fire protection, recreation, and administrative use. There would be about 4.5 miles of temporary road construction. Temporary road construction would be the same as Alternative 2. However, there would be about 5.1 fewer miles of road reconstruction and no road closures are proposed, except for closing the temporary roads constructed specifically for this project (Table 4). The 5.1 miles of roads not being reconstructed would receive routine, lower cost, road maintenance instead.

Like Alternative 2, this alternative would also consider the connected actions of other resource enhancement and restoration projects within the planning area that could be eligible for Knutson-Vandenberg Act (KV) funding generated by the timber sale(s).

Summary of Road Work Associated with Alternatives 2 and 3

Both action alternatives would provide a safe transportation system to adequately accesses proposed treatment areas. The differences between Alternatives 2 and 3 are the additional road closures and maintenance work proposed for Alternative 2 compared to Alternative 3. Overall, Alternative 3 road system project cost would be approximately \$40,000 less than Alternative 2 (see Chapter 3, p. 49 for details of road system costs).

The culvert removal and placement schedule would be the same for both action alternatives. Major culvert actions would include repair of the Brush Creek crossings, removing and replacing the existing three-barrel configuration with a large single barrel crossing that would

provide fish passage. Both alternatives would also remove and replace the 60-inch culvert at Traverse Creek.

The definition of “road maintenance” activities and “low-level reconstruction” (defined below Table 4) are the same except road maintenance does not replace asphalt, or remove and replace culverts.

Table 4. Road reconstruction and maintenance summary (miles) – Alternatives 1, 2 and 3

	Alternative 1	Alternative 2	Alternative 3
Reconstruction			
Low	0.00	38.7	33.6
Moderate	0.00	4.0	4.0
High	0.00	2.1	2.1
Totals	0.00	44.8	39.7
Maintenance	0.00	22.0	27.1
Totals	0.00	66.8	66.80

Maintenance – includes everything listed in ‘low-level reconstruction’ except asphalt surfacing and culvert replacement. Mile-for-mile maintenance costs less than reconstruction.

Low-level reconstruction may consist of:

- brushing roadside vegetation
- falling of snags and danger trees
- blading of roadbed
- cleaning of ditches and culvert inlets and outlets
- removing slough and slide material,
- placing crushed aggregate or asphalt surfacing and
- removing and replacing or installing new ditch relief culverts.

These standard maintenance and/or reconstruction activities occur on all roads when commercial activity occurs or it occurs on a rotating basis determined by use and need.

Moderate-level reconstruction includes the same items of work as low level with the addition of replacing culverts in intermittent and perennial streams that are not fish bearing.

High-level reconstruction could involve all the work items in low and moderate levels with the addition of replacing culverts in fish-bearing perennial streams and repairing major road failures within riparian areas.

Table 5. Road closures summary – Alternatives 1, 2 and 3

	Alternative 1	Alternative 2	Alternative 3
Proposed miles of additional road closure	0.0	4.0*	0.0
Proposed open road miles	51.7	47.7	51.7
Proposed closed road miles	15.1	15.1	15.1
TOTAL	66.8	66.8	66.8

* rounded from 3.96

Design Criteria and Mitigation Measures Common to the Action Alternatives

In response to LRMP standards and guidelines, laws and regulations, and public comments on the proposal, mitigation measures were developed to ease some of the potential adverse impacts the various alternatives may cause. The mitigation measures applied to both of the action alternatives.

Vegetation

- No gaps would occur within 100 feet of any stream.

Roads

- Best management practices (BMPs), including placement of sediment barriers, provision of flow bypass, and other applicable measures, would be included in project design as necessary to control off-site movement of sediment (BMPs R-2, 3, 4, 5, 7, 8, 9, 12, 13, 14, 18, 19, 20 and 23).
- For any perennial stream crossing culvert replacement, a specific dewatering plan shall be included with the contract design provisions (BMP R-13).
- Any instream activity such as culvert replacement or instream wood placement occurring within fish bearing and other perennial streams would comply with Oregon Department of Fish and Wildlife (ODFW) seasonal restrictions on instream work activities. For the Winberry Creek drainage, instream work must occur between July 1 and October 15, unless otherwise approved by ODFW (BMP T-5).
- All road reopening, reconstruction and temporary road building would occur during the dry season between June 1 and October 31 to avoid potential surface erosion of exposed soil (BMP R-3).
- All temporary roads shall be winterized if they are not to be used for extended periods of wet weather (LRMP FW-314, 315, 316, BMP R-23).
- To prevent sedimentation to the greatest extent possible, rock surfacing would be applied on all native surfaced roads to be used in the wet season between November 1 and May 31 (BMPs R-19, 20).
- Road maintenance along haul routes, including placement of additional surface rock, blading, brushing, ditch relief culvert cleaning or addition of ditch relief culverts shall occur as needed before, during, and after to project implementation (BMPs R-18, 19).
- At the completion of harvest activities, reopened roads and new temporary roads shall be water barred, seeded with approved forest mix design, and closed to vehicle travel to reduce potential for surface erosion and sedimentation (LRMP FW-101, 314-316, BMP R-23).
- All new temporary roads would be located at least 200 feet from a stream channel and on sideslopes of less than 30 percent.
- Wet weather log hauling would be monitored by the timber sale administrator and the hydrologist. When deemed necessary, log hauling may be suspended during heavy rainfall to prevent breakdown of road surface structure, pumping of fine sediment, and potential mobilization of sediment to streams (BMPs R-18, 20).
- Haul would be prohibited on native-surfaced roads during the wet season between November 1 and May 31 (BMPs T-5, R-18, 20).

- Winter log hauling would be allowed on roads 1802, 1816, 1821, 1824, 1802150, 1802159, 1802160, 1802162, 1821168, 1821199, 1824140, and 1824142, between November 1 and May 31. Haul will not cause damage to roads or National Forest resources. (BMPs T-5, R-18, 20).
- Under Alternative 2, approximately 4.0 miles of classified roads would be closed by blocking the entrance to the road to reduce the density of open road miles. These blocked roads are primarily to reduce disturbance to big game habitat, to rehabilitate roads for long-term storage in a hydrologically stable state, and to reduce the cost of road maintenance. The road block devices would be maintained over time to ensure the effectiveness of the closure. All temporary roads would be closed and put in a stable hydrologic condition after harvest activities.

Soils/Water/Fish

Riparian Buffers

- Any pile burning and grapple piling shall be kept outside of the designated no-cut buffers (LRMP MA-15-32, BMP F-2). See Appendix E for detailed listing of units where proposed grapple piling would occur.
- Stream buffers for the action alternatives include a minimum of 30-foot, no-cut buffers on all intermittent streams and 60-foot no-cut buffers on all perennial streams (BMPs T-7, 8). Between 60 and 170 feet along perennial streams, an average of 50 percent canopy closure would be maintained. Within no-cut buffers, tree felling or yarding is prohibited (with the exception of felling and yarding through skyline corridors, see specific mitigations under “Logging Operations”). Stream buffers are measured from the edge of active channel (stream banks) on both sides of the stream. The minimum buffers must be expanded to include the following features, if applicable:
 - Slope break = the point of topographic change below which management will result in active erosion or introduction of material into the stream channel or floodplain area.
 - Flood-prone area = area accessed by the stream during medium to large peak flow events, typically defined as the width at 2 times the bankfull depth.
 - High water table area = wetlands, seasonally saturated soils, standing water, seeps, bogs, etc.
- Trees in riparian buffers that need to be cut to facilitate harvest operations should be dropped into the stream if possible and left to aid in wood recruitment (LRMP FW-197).

Water Quality

- Water Quality - In cooperation with the State of Oregon, the Forest shall use the following process:
 1. Select and design BMPs based on site-specific conditions, technical and economic feasibility, and water quality standards for those waters potentially impacted.
 2. Implement and enforce BMPs (USDA Forest Service 1988).
 3. Monitor BMPs to ensure correct application and effectiveness as designed in attaining water quality standards.
 4. Mitigate to minimize impacts caused by activities when BMPs do not perform as expected.

5. Adjust BMPs when there is evidence that beneficial uses are not protected and water quality standards are not achieved. Evaluate the adequacy of water quality criteria for assuring protection of beneficial uses. Recommend adjustments to water quality standards as appropriate.

- To prevent water contamination, fuel and other petroleum products must be stored and refueling must occur at least 150 feet from any stream or other sensitive waterbodies.
- If the total oil or oil products storage at a worksite exceeds 1,320 gallons, or if a single container (i.e., fuel truck or trailer) exceeds a capacity of 660 gallons, the purchaser shall prepare and implement a Spill Prevention Control and Countermeasures (SPCC) Plan. The SPCC Plan will meet applicable EPA requirements (40 CFR 112); including certification by a registered professional engineer (LRMP FW-091, BMPs T-21, W-4, 8).

Coarse Woody Debris

- To the extent possible, avoid disturbance to the existing coarse woody concentrations during harvest operations (LRMP MA-15-16).
 - Ensure that existing snags 10 inches dbh or greater, and down logs 20 inches dbh or greater (which may occur in or adjacent to treatment areas) are protected to the greatest extent feasible during the proposed activity
- When it is feasible to do so, consider “high stumping” trees or snags 24 inches and larger in diameter during the falling of coarse woody debris. Creating stumps 3 to 6 feet in height would mitigate the loss of some existing roosting habitat more quickly than the delayed snag creation for bats and some existing perch, foraging, and potentially nesting habitat for land birds/neo-tropical migrants.

Logging Operations

- Inclusions within helicopter or skyline units suitable for ground-based logging systems would be logged using ground-based equipment. These areas are typically along existing roads, on ridgetops or benches adjacent to slope breaks where steeper topography begins, and are generally less than five acres in size. Similarly, areas that could be accessed with temporary roads and logged with skyline systems would be logged using a skyline system. Project implementation activities, including the logging feasibility report, unit layout, and sale administration will identify these areas.
- Landing and temporary road locations shown on the project planning maps and GIS layers are preliminary and approximate locations of the actual facilities that would be needed to log the proposed units. Actual locations are subject to agreement by the Forest Service and timber purchaser under the timber sale contract. All landings and temporary roads would comply with BMPs and programmatic consultation criteria. Any additional helicopter landings that require construction would be located in the flatter areas within units.
- Where cable yarding is planned, logging systems will be designed to yard away from stream channels to minimize soil disturbance in adjacent stream buffers (LRMP MA-15-27, BMP T-7).
- No landings would be used within 100 feet of a stream. If an existing landing within 200 feet of a stream is used, erosion control measures must be installed prior to use to prevent soil movement downslope from the landing. The landing must be rehabilitated (compacted soils fractured, seeded) after use. All new landings would be at least 200 feet from a stream.
- Landings planned for use between Oct 16 and May 14, must be surfaced with aggregate material.

- Skid trails must not be constructed through areas with a high water table, or be located in areas that will channel water onto unstable headwall areas.
- All skid roads (defined as more than five passes by a machine) used for ground-based operations will be designated on the ground to limit extent of soil compaction.
- Where practicable, ground-based machines will place logging slash on skid trails to create slash mats for machines to walk on. These mats act as a buffer for soils during logging.
- A harvester may be used for felling on slopes up to 45 percent on unbroken terrain, no closer than 100 feet from any stream channel, and will only be allowed a single trip there and back over a designated, slash-covered trail.
- Grapple piling would occur from roads only.
- Yarding corridors that cross stream channels would use full suspension within the no-cut buffers, and yarding corridors would not exceed 15 feet wide (LRMP MA-15-26,27, BMPs T-8, 12). Within the outer portion of the riparian reserve, full or one-end suspension would be required.
- Seasonal restriction would be imposed on all helicopter activity and other noise-generating activities associated with project activities during the spotted owl critical nesting period between March 1 and July 15. This restriction does not apply to ground-based activities such as falling, yarding, or hauling that are beyond 0.25 mile of suitable spotted owl habitat.

Soils

- Cumulative soil impacts of past and present roads, landings and skid trails shall not exceed 20 percent for each unit being thinned as part of this project (LRMP FW-081, 082, 083). The detrimental soil conditions potentially applicable to this planning area and the proposed management activities include compaction, soil puddling, displacement, and extent of the activity in the area. The units that may exceed 20 percent detrimental soil disturbance are: 1160, 1242, 1257, 1310, 1323, 1370, 1387, 1388, 1408, 1412, 1421, 1432, 1443, 1476, 1495, 1511, 1514, 1539, 1639, 1647, 1701, 3434, 4972, 10228, and 10307. These units will have all landings, temporary roads, and main skid trails ripped and seeded to return the area to pre-harvest conditions (see additional mitigations for soils in Appendix D).
- Log suspension requirements and fuel reduction operations are prescribed to minimize soil disturbance within FW-081 and FW-084 (from LRMP) limits. In the case where mineral soil is exposed in specific locations beyond the level of maximum allowable disturbance, the site would be waterbarred, seeded, and fertilized immediately following harvest.
- Apply Forest-approved grass seed to all bare mineral soil left after road decommissioning or road closure. Place laid-back sideslopes of fill removals, and apply coverage of native slash or weed-free straw to prevent surface erosion from direct raindrop impact during the first storms after fill removal (BMP R-5).
- Protect unstable areas identified by field visits in the early planning stages, as well as those identified during project implementation with adequate no-cut buffers (LRMP FW- 105, BMP T-6). Any additional unstable areas identified during project implementation will be protected with adequate buffers (LRMP FW- 105, BMP T-6). Unstable units identified are: 1242, 1257, 1323, 1364, 1378, 1421, 1446, 1523, 1538, 1539, 1566, 1658, 1679, and 3262.
- The following unstable slopes will be protected with a buffer of at least 100 feet wide from the edge of the unstable or sensitive area:

- areas adjacent to streams with indicators of active erosion such as ravel on the surface or jack-strawed trees),
- sensitive stream reaches (such as streams where the dominant channel substrate is sand),
- or channels with high residual impacts (i.e., bank erosion, downcutting, heavy fine sediment load).

Wildlife

Management Indicator Species

- For cavity excavators (including pileated woodpecker and marten): Retain existing snags and protect down logs to the greatest extent feasible as addressed in the silvicultural prescription.

Big Game

- Enhance openings associated with proposed activities such as landings, burn piles, soil treatment areas by applying approved forage seed mix and fertilizer.

Threatened, Endangered, and Sensitive Species

Northern Spotted Owls

(see logging operations)

Bald Eagle

- Ensure that potential bald eagle nest, roost, and perch trees (remnant overstory live trees and snags) are protected to the greatest extent feasible as documented in the project's silvicultural prescription are implemented as proposed.

Baird's Shrew and Pacific Shrew

- Ensure that riparian reserve buffers and variable density thinning component identified in the project's silvicultural prescription are implemented as proposed. This measure would provide refugia throughout areas affected by proposed activities and would mitigate negative effects to individuals that may be present and disturbed by such activities.

Pacific Fringe-tailed Bat

- In the event a significant bat roost is located within the project area, District or Forest wildlife biologist should be contacted to inspect the site, assess any project activities for their potential to impact bats, and implement recommendations to protect the site.

Oregon Slender Salamander

- Ensure that current snag, defective tree, and down wood habitat is protected to the greatest extent feasible during proposed activities as addressed in the project's silvicultural prescription. Also, ensure that future dead wood habitat is provided for as prescribed.

Cascade Torrent Salamander

- Ensure that riparian reserve buffers identified in the project's silvicultural prescription are implemented as proposed.

Fisheries

- Any in-stream activity such as culvert replacement occurring within fish bearing and other perennial streams will comply with Oregon Department of Fish and Wildlife (ODFW) seasonal restrictions on in-stream work activities. For Fall Creek tributaries, in-stream work must occur between July 1 and October 15 unless otherwise approved by ODFW (BMP T-5).

Rare and Uncommon Botanical Species

- Known locations of the sensitive lichen *Usnea longissima* would be flagged prior to implementation. No thinning would occur within 170 feet of identified sites. If a known location is adjacent to a road, the protection buffer would extend only to the opposite roadside edge. Protection of *U. longissima* host trees would ensure propagule source for future establishment
- Known locations of *Peltigera pacifica* will be flagged prior to implementation. In order to facilitate project implementation various protection buffers were prescribed for *P. pacific*. Protection buffers for *P. pacifica* are as follows:
 - 170 foot full protection no cut buffer: sites CW14, CW6, CW7, MCR001, TEC06 and JC1
 - 50 foot protection no cut buffer: sites AH02, CW5, JC2, TEC 18, TEC25
 - 0 foot protection no cut buffer: sites CCS01, CCS02, CCS03, CCS04, AH09 and TEC15
- If sensitive plants are identified during implementation, the district botanist will be notified to determine if additional mitigation measures are necessary for the protection of a new occurrence.

Special Botanical Habitats

- Directionally fell trees away from identified special habitat to ensure minimal to no impacts from thinning activities.

Invasive Weeds

- Weeds populations classified as new invaders in the project area will be treated prior to harvest activities and follow all guidelines as outlined in the Willamette Integrated Weed Management EA.
- In areas where false brome (*Brachypodium sylvaticum*) exists in units and along roadsides adjacent to units a 50-foot no-cut buffer in addition to pretreatment will be required to contain the infestation and restrict the spread potential of this highly invasive weed.
- Pressure wash construction and logging equipment prior to entering the sale area. Areas designated for washing equipment prior to entry or after completion will be monitored for five years and will be treated if necessary following Willamette Invasive Weed EA guidelines.
- If specific units contains a high proportion of invasive weeds at time of implementation and pre-treatment is not possible, conduct thinning activities last in order to reduce propagule dispersal into non-infested areas.
- Obtain gravel for road construction and reconstruction from a weed-free rock source.
- Minimize areas of soil disturbance during all harvest activities including spur road construction and re-opening, road reconstruction, fuels treatment, etc. Seed all heavily

disturbed areas with native species, including landings and subsoiled skid roads to reduce weed establishment.

- Treat and eradicate all noxious weeds along roads prior to closure.
- Berm, gate, or rip and seed any new roads and re-opened roads to reduce disturbance and incoming seed due to vehicular traffic.
- Implement Pacific Northwest Regional Invasive Plant Program (USDA 2005) prevention standards 3, 12, and 13 for use of certified weed free mulches, development of long-term site strategy for restoration and revegetation, and use of native plant materials for revegetation and restoration and rehabilitation.

Fuels

- Fuel treatments would reduce fine fuel loadings created from the commercial thinning. Fuel treatments include yarding tops and grapple piling and burning at landings, grapple piling within 40 feet of most roads left open, hand piling, and burning.

Air Quality

- Air quality would be maintained by adhering to the Oregon Smoke Management Plan and additional monitoring of low-level winds to insure that burning occurs when the risk of smoke intrusions into designated areas and Class I airsheds is low. Various fuel treatments methods such as yarding top, grapple piling along roads, and hand piling and burning, during spring-like conditions would be used. The slash piles would be covered and dry when burned which reduces the amount of smoke produced.

Cultural

- The 14 heritage resources within or immediately adjacent to treatment units would be flagged (with buffers applied). No trees would be harvested within 25 meters of a buffered site; felled trees would not fall into a site buffer; landings and staging areas should be located a minimum of 50 meters from buffered sites. Sites would be preserved in-place for future scientific study. Historic properties (sites eligible to the National Register of Historic Places or sites with undetermined eligibility status) would be monitored during or post-project activities, as determined by the Forest Archaeologist. It is further recommended that heritage resource site locations be provided to the sale administrator to ensure inadvertent effects do not occur.

Recreation and Public Access

- Logging activities and culvert removal near Winberry Campgrounds would be posted with signs and operations restricted during high use periods. Any road damage that occurs in the project boundary due to project implementation would be rehabilitated to the condition prior to the project implementation.
- All logging operations that involve helicopter yarding over main National Forest classified roads would require traffic flaggers for public safety. Disperse camping areas will be signed and restricted within flight path areas.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. The table should be used in conjunction with the discussion of issues in Chapter 3 – Environmental Consequences to fully understand the implications and differences of the alternatives.

Table 6. Comparison of alternatives

Project Features	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3
Acres of thinning	0	2,564	2,564
Harvest volume		40 MMBF	45 MMBF
Logging systems	0	ground-based, skyline, & helicopter	ground-based, skyline, & helicopter
Slash treatments (acres) Yarding tops Grapple piling along roads	0	2,408 120	2,092 40
Temporary Road construction (approximate miles)	0	4.5	4.5
Road reconstruction (miles)	0	44.8	39.7
Road maintenance (miles)	0	22.0	27.1
Road closure	0	All temporary roads used for harvest closed after project complete; 3.96 miles of existing roads closed	All temporary roads used for harvest closed after project complete
Proposed Open Road Miles	51.7	47.7	51.7
Proposed Closed Road Miles	15.1	19.1	15.1
Significant Issues			
Project cost (includes maintenance, construction & closures)	0	\$948,041	\$889,178
Gap Openings	NA	Gap openings up to 1 acre and covering up to 385 acres (15%) of treatment area	Same as Alt 2, but covering up to 513 acres (20%) of the treatment area
Open Road Density (miles/sq mi)	2.4	2.2	2.4

Monitoring

The following project-specific monitoring would occur:

- Field visits and verification that the proposed road closures occur and that the closures occur in a timely manner. Often road closures completed with KV funding occur well after project completion.
- Monitoring and field verification that road closures/decommissions are adequate to remove hydrologic connection of road drainage network to stream channels.
- Sites receiving a 0 and 50-foot no-cut buffer will be monitored one, two and five years after implementation for symptoms that might indicate loss of populations due to thinning.

Results of these monitoring tests could then be applied to future occurrences of *P. pacifica* in the forest.

- Annual invasive weed monitoring would be done for five years following treatments on all landings and areas where ground-disturbing activities have occurred.
- Recreation sites mentioned in this report monitored during project implementation to determine compliance with mitigation and determine if additional mitigations are needed.
- Heritage resource sites mentioned in this report monitored during project implementation to determine compliance with mitigation measures and determine if additional measures are needed.