

Chapter 2 - Alternatives

This chapter describes and compares the alternatives considered for the Jackson Thinning project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Process Used to Develop Alternatives

Alternatives to the proposed action were developed and refined after reviews of the project area by and discussions between the interdisciplinary team and responsible official. The three alternatives to the Proposed Action aim to address the significant issues, given the Purpose and Need for the project and the feasibility of implementing the alternatives in the project area.

In addition to the Proposed Action, three alternatives to the Proposed Action and a No Action alternative are considered in detail in Chapter 3. Other alternatives were considered, but eliminated from further study.

Alternatives not considered in detail

The Forest Service considered a wide range of options. The components of alternatives eliminated from detailed consideration, along with rationale for their dismissal, are as follows:

Thinning in Units 27 and 29: Units 27 and 29 were deemed not commercially viable for thinning and dropped from further consideration.

Thinning in Units 12, 15, 19, 25, 26, 28, 30, and 31: Approximately 926 acres were eliminated from consideration before the public scoping stage due to their location in LSR and stand age being over 80 years old.

Thinning and fire hazard reduction in Units 13 and 14: The original scoping letter proposed to thin Units 13 and 14 that were adjacent to private land and Bonneville Power Administration powerlines for vegetation management and fire hazard reduction purposes. This alternative was not considered in detail because further reconnaissance of Units 13 and 14 found patches of old-growth trees scattered throughout the unit, and access to Unit 14 was prohibitive due to cost and environmental impact required to cross Turner Creek.

Temporary road construction on Mt. Walker: The original scoping letter also proposed to construct temporary roads to access stands on Mt. Walker. This alternative was dropped from consideration due to public concern about the visual impacts to Mt. Walker, as well as the low likelihood of future silvicultural management needs for those roads.

Temporary road construction in Units 10, 11, 17, and 18: Approximately 2.2 miles of new temporary road and 0.4 miles of unclassified, abandoned road were considered to access Units 10, 11, 17, and 18 for cable-yarding. These roads, however, would cross approximately 3,375 feet (0.71 miles) of potentially unstable landforms with approximately 1,100 feet (0.21 miles) within 100 feet slope distance of a stream. Construction of these roads would also require some substantial cut and fills to create the road prism and several large, temporary stream crossing culverts. These roads were dropped from further consideration due to concerns about compliance with the Northwest Forest Plan Aquatic Conservation Strategy.

Noncommercial Restoration Alternative: Consideration was given to implementing the thinning through noncommercial means. This alternative, however, was deemed to be impractical from a feasibility stand point because of the low likelihood that a funding source could be secured to implement the project.

Alternatives

No Action Alternative

The National Environmental Policy Act (NEPA) requires a No Action alternative. This alternative is designed to provide a baseline of the existing condition for comparison with the action alternatives.

Under this alternative, forest stands in the proposed project area would remain untreated. This alternative would also retain all roads, both authorized and unclassified, abandoned roads in their current condition. No funds would be generated for additional restoration opportunities in the project area. Existing recreation opportunities would not be affected.

Alternative A (Proposed Action)

This alternative is designed to accelerate the development of late-successional characteristics in second-growth stands that include fire-regenerated stands on Mt. Walker. Existing roads and unclassified, abandoned roads are used where possible. Consideration was given to the opportunity to improve the condition of existing roads and better decommission unclassified, abandoned roads as part of the project.

Forest Stand Treatment

A planning area approximately 10,500 acres in size was analyzed and resulted in this alternative to commercial thin approximately 2,313 acres, with about 943 acres in AMA and 1,370 acres in LSR lands. Approximately 781 acres would be harvested by helicopter, 1,406 acres cable-logged, and 126 acres ground-based logged. The project implementation is expected to be completed through multiple commercial sales.

Thinning Objectives

The objective of this entry would be to reduce stand density and add structural and spatial complexity; maintain or increase crown and branch size and diameter growth of individual trees; introduce or continue to develop an understory of seedlings/saplings, shrubs, and herbs; increase the number of snags and snag recruitment trees suitable for cavity nesters; and to contribute to coarse woody debris recruitment. Hardwoods would be retained and, in some areas, also enhanced. Thinning generally would have an objective of reducing stand relative density to about 30 to 35 (Douglas-fir or hemlock density), a mid-level of thinning between maximizing stand growth and yield (40) and maximizing individual tree growth (30). Fewer trees may be removed (an objective of at most 1/3 basal area removed), however, in areas where root rots or other factors increase the vulnerability the stand to windthrow.

Treatment Boundaries

The boundary of the unthinned, dense, plantation conifer stand type and proximity to streams would be used to locate boundaries. Boundaries would be delineated using slope breaks of channel inner gorges, headwalls, or potentially unstable slopes; stand type or vegetation change; or the distance from the stream bank as specified in the riparian no-cut buffer described below, whichever is greater. In addition, at least one row of trees would be left unthinned between the treatment area and defined stream channels to provide shading. Wetlands and streams would be similarly protected by no-treatment buffers.

Thinning

The silvicultural treatment prescribed would be “thinning from below” where smaller diameter trees are removed to create additional growing space for the remaining larger trees. The contract specification that would be used to implement this thinning from below prescription was developed on the Willamette National Forest and adapted for use on the Olympic National Forest. The contract specification utilizes a spacing guide so that the logger selects cut- and leave-trees on a purely mechanical basis, eliminating any judgment calls that could violate the intent of the National Forest Management Act. The technique results in variably spaced trees and a wider range of leave-tree diameters than a strict thinning from below prescription, but generally removes smaller trees and leaves larger trees. Generally, trees under 8-9 inches dbh, however, would not be harvested and would be left to remain in the stand.

Thinning would generally be done without regard to tree species, except that all cedars and minor hardwood species would not be cut. Some hardwoods, however, would be selected (by species and diameter) to have a 20-foot radius clearing around them to enhance their canopy structure and fruiting ability. Buffers would be utilized around other forest components, such as around potential marbled murrelet nest trees and some minor tree species, to further enhance variability in the resulting forest structure.

In general, approximately 60-90% crown closure would be maintained across the stands. Exceptions include specified gaps and areas used for landings.

Cut-tree diameter limits

Trees over 20-inches dbh would not be cut in any LSR units. Mt. Walker Units 20, 21, 23, and 24 would have an upper diameter limit on cut trees somewhat higher than 20 inches in order to retain the larger trees as currently variably spaced throughout these stands, while still allowing a thinning to control density. If trees above the diameter limits are cut for cable corridors, landings, or any other reason, they would remain on site as coarse woody debris.

Generally, no trees under 8-9 inches dbh would be harvested.

Damaged trees

Leave trees would be selected irrespective of whether the tree has any damage, so that trees with defects, potential cavity or nesting trees and other similar features of structural diversity may be retained in the units. In this case, the term “damage” refers to breakage, double tops, crooks, heart rots, ants, etc., that cause loss of wood volume, but usually don’t kill the tree. Trees with fading crowns or bleeding boles indicative of root disease that may kill some trees and create snags and coarse woody debris over time generally would not be discriminated against in this prescription, except in certain identified root rot pockets in Units 1 and 3.

Cedar and hardwoods

In general, except as noted in the stand prescription notes found in Table 39 in the Appendix, all western redcedar would be retained. All Pacific yew existing within the stands would be retained and protected, as would any cascara, willows, and other minor hardwoods. Except as noted in Table 39, all alders and other hardwoods are to be considered “ghost trees” to be retained for mollusk and neo-tropical migrant bird habitat when located outside of existing skid trails, yarding corridors, landings, and road locations that would be used for this treatment. They would not be used for spacing, nor would they be cut. Vine maple would not be cut, except where necessary for yarding, in order to maintain existing species diversity and to help provide a continuous “column of vegetation that includes low shrubs, tall shrubs, and midstory trees” (Carey and Johnson, 1995).

Coarse woody debris

Coarse woody debris (CWD – dead and down wood on the forest floor, existing on the site prior to thinning) may be moved for access, but would not be removed from the site. Disturbance would be minimized. Logging activities may have a side effect of reducing CWD, but this effect would be minimized by using designated skid roads and cable corridors. Temporary roads and skid trails would be blocked after logging to conserve CWD that might otherwise be removed for firewood. Big, old stumps would be kept intact and not uprooted wherever possible.

Large tree protection

Individual and small groups of residual large, old trees found in Units 1-9 and 21 would be retained and buffered. An unthinned buffer with a radius of 100 feet would be left around these residuals, as recommended by the Forest Survey and Manage Coordinator to maintain microclimate conditions around these trees. Units 10 and 11 may have several old-growth trees each located adjacent to one of their side boundaries that would be buffered in layout or otherwise protected with a no cut area within 100 feet of the trees.

Snag protection

Snags would not be felled unless logging safety is jeopardized. If worker safety is at risk, snags could be felled, but must be left on-site as coarse woody debris. Where identified, legacy snags greater than or equal to 30 inches dbh would be buffered in layout with a no-cut area a minimum of 1.5 times the height of the legacy snag (to meet safety requirements).

Additional skips (no-cut areas)

No-cut “skip” areas would include stream buffers, some minor tree species, and other areas as described in the alternative description or project design criteria.

Additional skips (approximately 0.5 or 0.75 acre in size, but with the opportunity to form skips of 1, 1.25, and 1.5 acres when skip areas adjoin one another) would be designed for thinning units as needed in areas that lack these features, providing for untreated areas amounting to approximately 15% of thinned stands.

Finally, refer to Table 39 for additional notes on skip areas associated with various individual stands.

Gaps

Occasional blowdowns and snapped tops would provide small to mid-sized gaps in the forest. To increase stand heterogeneity, the thinning treatment, including clearing around larger bigleaf maples, would provide gaps at the lower end of the range of gap sizes.

Except for the Mt. Walker units, additional mid- to upper-sized gaps (approximately 0.1-0.25 acre) would be designed for this treatment in areas protected from wind and away from roads and landings, amounting to as much as 5% of thinning units. All trees larger than the minimum diameter limit, except a center tree and any hardwoods, cedar, and white pine, would be removed from gaps. Gaps would not be created in the Mt. Walker units since they would impact the unbroken tree canopy, a landscape characteristic of the area.

Units 1, 3, and 6 each have one or more Phellinus root rot pockets that may be cleared (up to 1.5 acre patches) and planted with root rot resistant tree species (alder, bigleaf maple, white pine).

Heavy thinning

In stands with low wind throw potential, areas of heavy thinning (0.5 or 0.75 acre, but with the opportunity to form patches of 1, 1.25, and 1.5 acres when heavy thin areas adjoin one another) would be prescribed for these stands, amounting to approximately 7% of the stand area. Heavily thinned patches would be thinned to 20-50 trees per acre, retaining hardwoods and minor conifer species as “ghost trees.” In stands with moderate wind throw potential, wind can be expected to create similar areas of variability and provide some areas of low overstory stocking over the next 10 to 20 years following treatment.

Riparian buffers

Protective vegetation no-cut areas (i.e., buffers that would not be commercially thinned) would be implemented to protect sensitive areas such as all perennial fish-bearing streams, potentially unstable areas, and wet sites to maintain stream temperature, maintain slope stability (including headwalls), and to protect riparian vegetation.

For permanently flowing, fish-bearing streams (Unit 1, 2, and 3), buffers shall include whichever of the following slope distance is greatest:

- At least two rows of trees upslope from the edge of the inner gorge² slope break of the streambank,
- A slope distance of 100 feet from the edge of the streambank, and
- For steep sideslopes (>70%) with a defined slope break, locate the no-cut buffer to a distance where the average slope is less than 70%.

For permanently and intermittent, non-fish-bearing streams (for all units, except Unit 1, 2, and 3) buffers shall include whichever of the following is greatest:

- At least one row of trees upslope of the edge of the inner gorge slope break of the streambank,
- At least 66 feet (1 chain) slope distance from the edge of the streambank, including sideslopes >70% without a defined slope break, and
- A distance where the average slope is less than 70% for sideslopes, >70% where there is a defined slope break.
- In cases when determining intermittent stream channels are unclear or questionable a fisheries biologist or soil scientist will be consulted.

² Inner gorges typically have slopes ranging from 75% to over 90%. The slope shape is concave to straight and are kept in a dynamic stable/unstable state as stream action on the toe continually undercuts and oversteepens portions of the slope. In general, materials are over their natural angle of repose in this area.

Roads

Roads proposed for use include the following:

- Forest system roads open to motorized vehicle use (maintenance levels 2 and 3);
- closed Forest system roads (maintenance level 1);
- unclassified, abandoned roads (remnant of historic logging activities); and
- newly constructed temporary roads.

The list below is a breakdown of approximate mileage by road classification and post-harvest treatment under Alternative A. More information on the roads proposed for use may be found in Appendix C.

33.3 miles of existing, open Forest system roads would be used and kept open post-project.

These roads would be improved and maintained at standards necessary for safe timber haul during project implementation.

1.2 miles of existing, open Forest system roads would be used and then closed following project implementation. If funds are available, these roads may be decommissioned as proposed in the Olympic National Forest Access and Travel Management (ATM) Plan.

0.1 mile of closed forest system road would be reopened for use and then closed following project implementation. If funds are available, this road may be decommissioned as proposed in the Olympic National Forest Access and Travel Management (ATM) Plan.

2.4 miles of unclassified, abandoned road would be used and then decommissioned following project implementation.

3.8 miles of new temporary road to be constructed and then decommissioned following project implementation.

Short, temporary spur extensions of approximately 100 feet in length would be made as necessary off of system roads for public and worker safety purposes or to assist cable yarding operations. These spurs, estimated to total less than a mile under any alternative, would be decommissioned and blocked from vehicle access following project implementation.

Reconstruction of existing open roads to bring them to a standard for safe log haul may include work that would also improve road drainage and/or fish passage.

Further elaboration on road treatment definitions may be found in Appendix D.

Unclassified, abandoned roads

The unclassified, abandoned roads proposed for use in this project are existing old road grades that were constructed for initial harvest decades ago. These roads are not considered to be part of the Forest road system and have not been maintained since their initial use. The road profile still exists on most of these roads, but the road surface is now covered with trees and shrubs of varying sizes. Cuts and fills have vegetation similar to the adjacent forest environment. Work needed to bring these roads to a useable standard range from light clearing and grubbing to minor excavation; removal of vegetation that has re-established in the road prism; drainage improvements; and additional surfacing. Unclassified, abandoned roads proposed for use in

this project would be treated as temporary roads. As such, these roads would be decommissioned following project implementation.

Figure 7. Example of an unclassified, abandoned road.



New temporary roads

As specified under the Project Design Criteria section, all new temporary roads would be constructed to minimize resource impacts while allowing for safe operations. Roads would be located and designed to minimize disruption to hydrologic flows, follow the contour of the terrain where possible, and minimize clearing widths to what is necessary for safe haul and prevent loss of overhead canopy cover. Following use, temporary roads, as with landings and skid trails, would be decommissioned. Below are pictures of temporary roads during use and following decommissioning (Figure 8 and Figure 9).

Figure 8. Pictures of temporary roads during use.

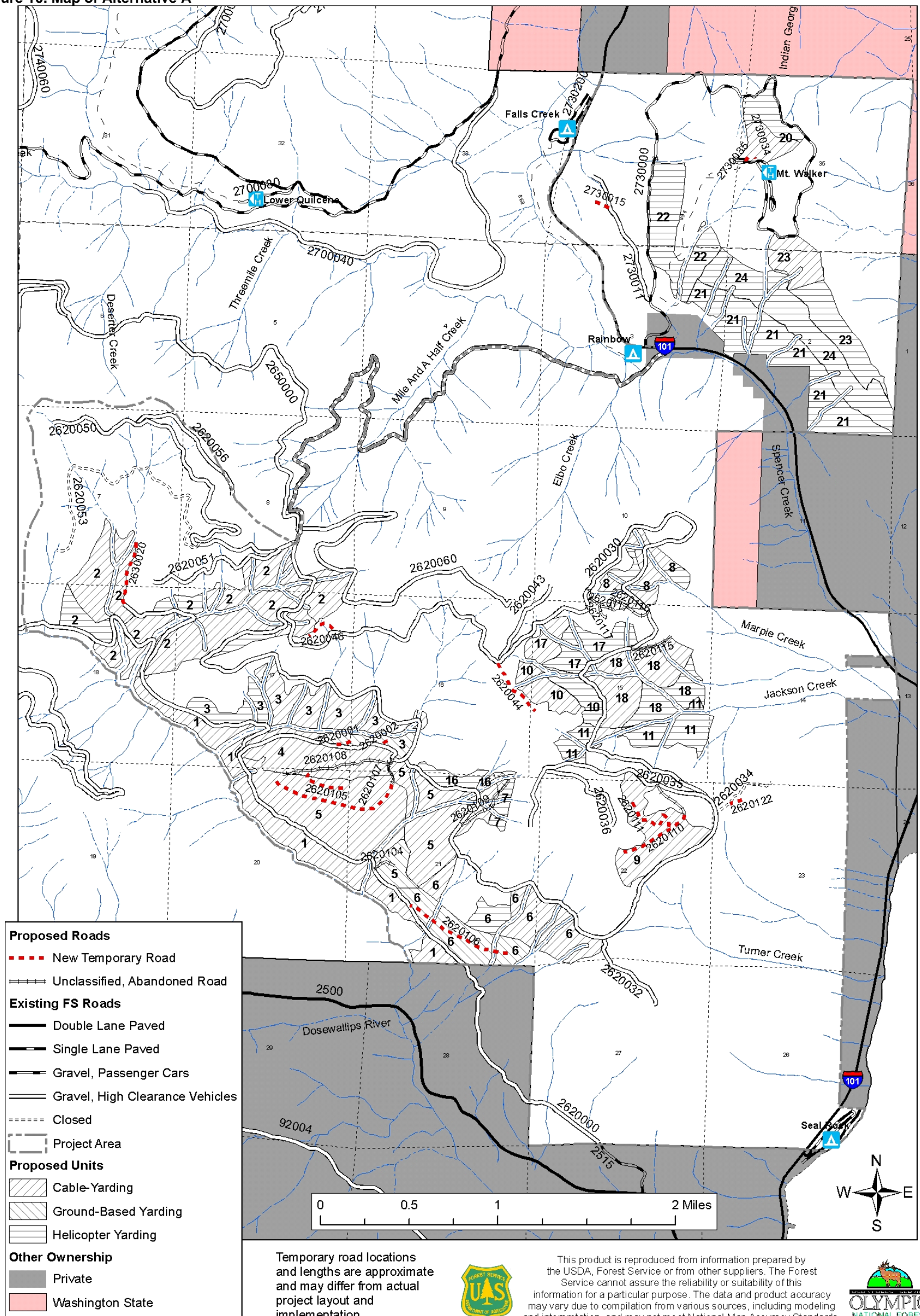


Figure 9. Pictures of temporary roads after decommissioning and surrounding thinned forest.



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Figure 10. Map of Alternative A



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Alternative B

This alternative addresses the significant issues of thinning in older, fire-regenerated stands and impacts to recreation by dropping proposed units on Mt. Walker (Units 20-24). Unit 6 is also omitted from this alternative because of the presence of scattered, remnant large, old trees within the unit.

Forest Stand Treatment

This alternative proposes to commercially thin approximately 1,606 acres, with about 415 acres in AMA and 1,191 acres in LSR lands across a planning area approximately 10,500 acres in size. Approximately 303 acres would be harvested by helicopter, 1,253 acres cable-logged, and 50 acres ground-based logged.

Outside the changes noted above, the proposed thinning treatment for stands included in this alternative would follow the same prescription as detailed in Alternative A.

Riparian buffers

Alternative B would use the same riparian buffer prescription as Alternative A.

Roads

Roads proposed for use include open Forest system roads; closed roads; unclassified, abandoned roads (remnant of historic logging activities); and new temporary roads.

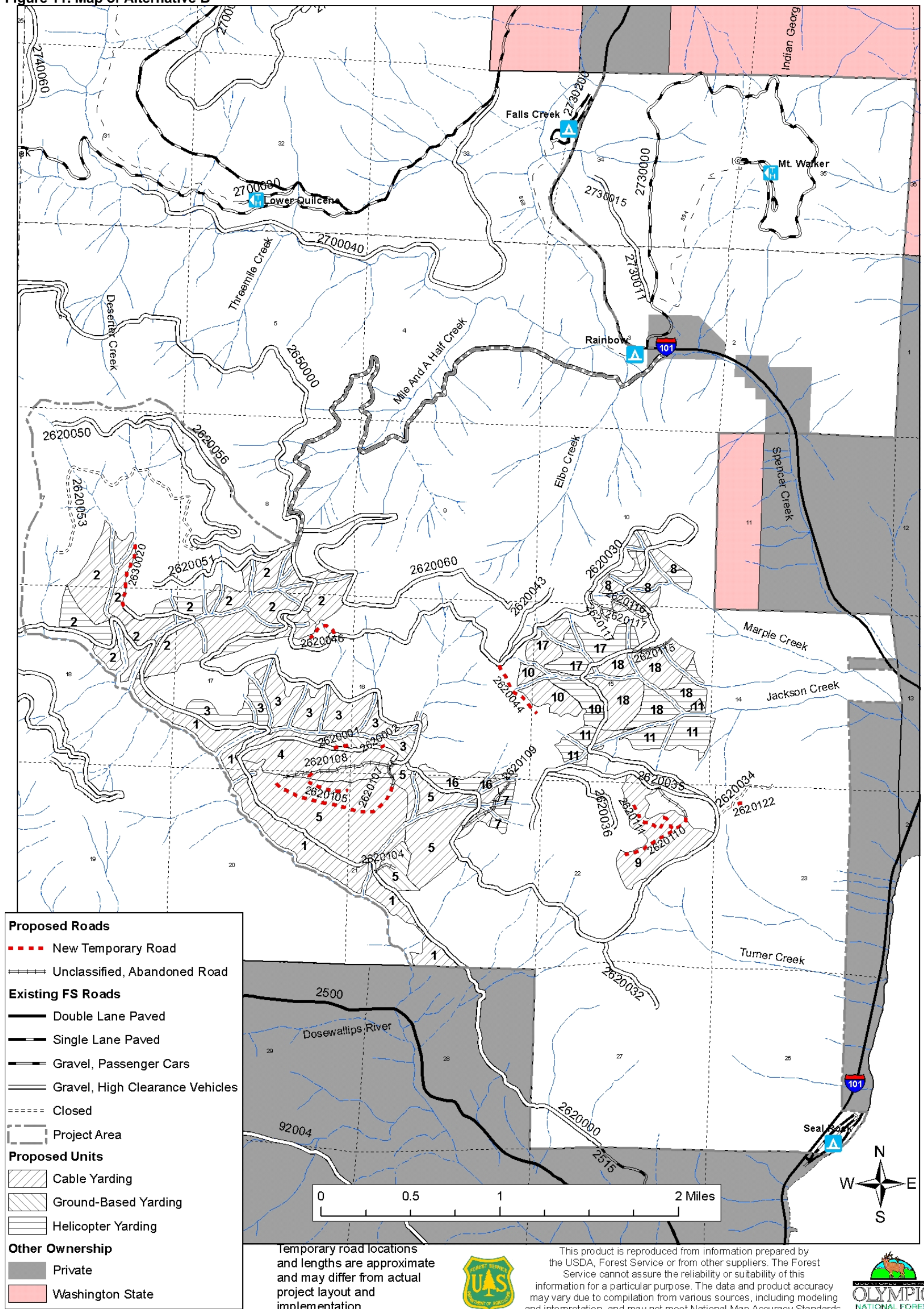
The list below is a breakdown of approximate mileage by road classification and post-harvest treatment. More information on the roads proposed for use may be found in Appendix C.

- 28.9 miles of existing Forest system roads would be used and kept open post-project. These roads would be improved and maintained at standards necessary for safe timber haul during project implementation.
- 1.2 miles of existing, open Forest system roads would be used and then closed following project implementation. If funds are available, these roads may be decommissioned as proposed in the Olympic National Forest Access and Travel Management (ATM) Plan.
- 0.1 mile of closed forest system road would be reopened and then closed following project implementation. If funds are available, this road may be decommissioned as proposed in the Olympic National Forest Access and Travel Management (ATM) Plan.
- 2.4 miles of unclassified, abandoned road would be reopened and then decommissioned following project implementation.
- 3.1 miles of new temporary road would be constructed and then decommissioned following project implementation.

Short temporary spur extensions of approximately 100 feet in length would be made as necessary off of existing system roads for public and worker safety purposes or to assist with cable yarding operations. These spurs, estimated to total less than a mile under any alternative, would be decommissioned and blocked from vehicle access following project implementation.

Reconstruction of existing open roads to bring them to a standard for safe log haul may include work that would also improve road drainage and/or fish passage.

Figure 11. Map of Alternative B



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Alternative C

This alternative aims to address the significant issues of road-related sedimentation impacts by reducing the amount of proposed road use and increasing the use of helicopter logging. The portions of Units 20 and 23 on Mt. Walker proposed for cable yarding under Alternative A are also proposed for helicopter logging in this alternative to reduce potential impacts to visual quality on Mt. Walker.

Forest Stand Treatment

This alternative proposes to commercially thin approximately 2,313 acres, with about 943 acres in AMA and 1,370 acres in LSR lands across a planning area approximately 10,500 acres in size. Approximately 1,475 acres would be harvested by helicopter, 812 acres cable-logged, and 26 acres ground-based logged.

Outside the changes noted above, the proposed thinning treatment for stands included in this alternative would follow the same prescription as detailed in Alternative A.

Riparian buffers

Alternative C would use the same riparian buffer prescription as Alternative A.

Roads

Roads proposed for use include open Forest system roads; closed roads; unclassified, abandoned roads (remnant of historic logging activities); and new temporary roads.

The list below is a breakdown of approximate mileage by road classification and post-harvest treatment. More information on the roads proposed for use may be found in Appendix C.

33.8 miles of existing, open Forest system roads would be used and kept open post-project.

These roads would be maintained at standards necessary for safe timber haul during project implementation.

1.2 miles of existing, open Forest system roads would be used and then closed following project implementation. If funds are available, these roads may be decommissioned as proposed in the Olympic National Forest Access and Travel Management (ATM) Plan.

0.1 mile of closed forest system road would be reopened for use and then closed following project implementation. If funds are available, this road may be decommissioned as proposed in the Olympic National Forest Access and Travel Management (ATM) Plan.

0.4 miles of unclassified, abandoned road would be used and then decommissioned following project implementation.

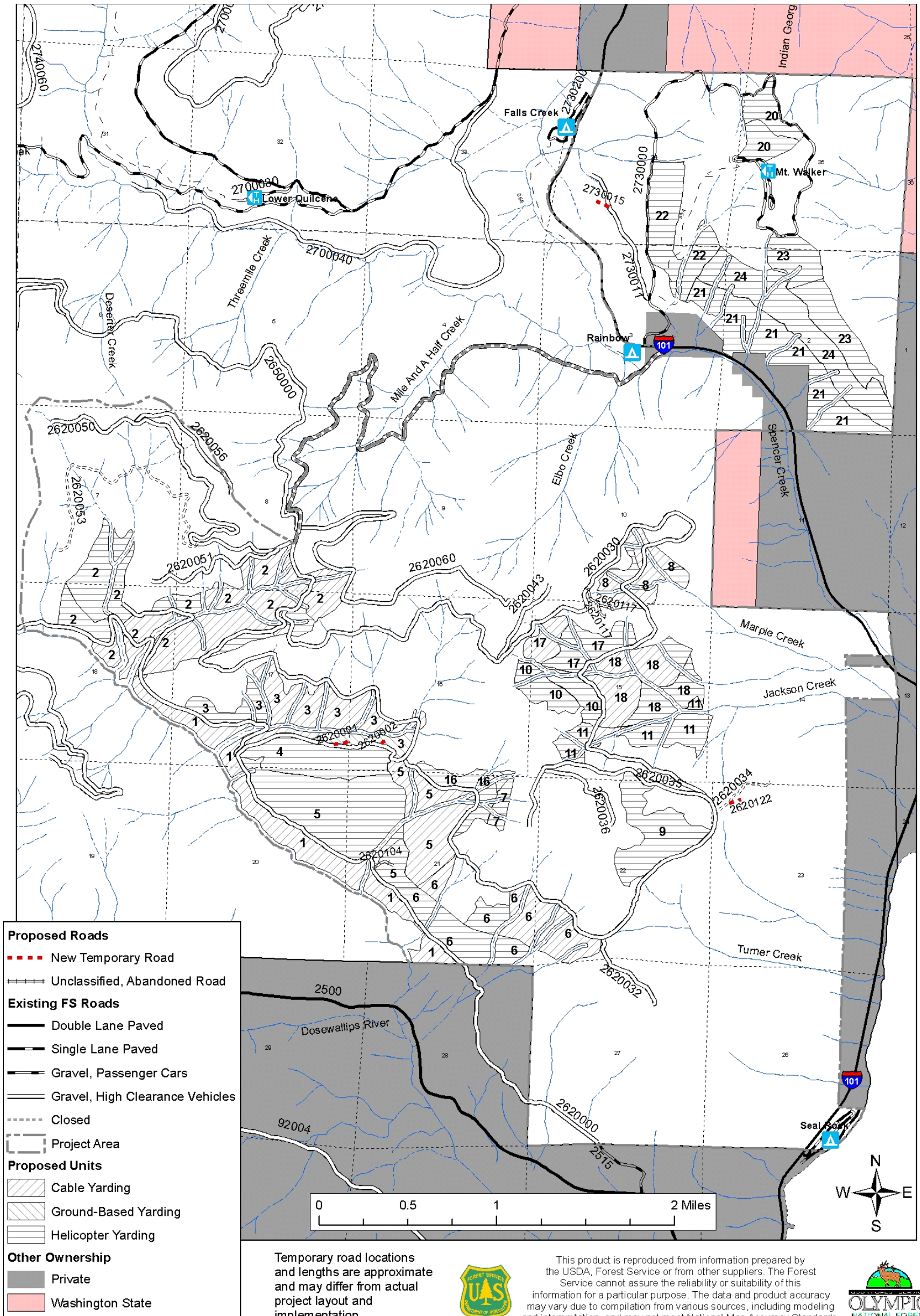
0.4 miles of new temporary road to be constructed and then decommissioned following project implementation.

Short, temporary spur extensions of approximately 100 feet in length would be made as necessary off of system roads for public and worker safety purposes or to assist cable yarding

operations. These spurs, estimated to total less than a mile under any alternative, would be decommissioned and blocked from vehicle access following project implementation.

Reconstruction of existing open roads to bring them to a standard for safe log haul may include work that would also improve drainage and/or fish passage.

Figure 12. Map of Alternative C



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Alternative D

This alternative aims to address soils, aquatic, and wildlife concerns identified by the public and members of the interdisciplinary team. This alternative proposes to drop Unit 6 due to the presence of scattered, remnant old-growth trees within the unit; and modify treatment on Mt. Walker by dropping Unit 21 due to the larger sized trees and a portion of Unit 23 that has areas of shallow soils, and helicopter yarding all of Unit 20 to minimize potential impacts to visual quality.

Forest Stand Treatment

This alternative proposes to commercially thin approximately 1,956 acres, with about 766 acres in AMA and 1,190 acres in LSR lands across a planning area approximately 10,500 acres in size. Approximately 611 acres would be harvested by helicopter, 1,245 acres cable-logged, and 50 acres ground-based logged.

Outside the changes noted above, the proposed thinning treatment for stands included in this alternative would follow the same prescription as detailed in Alternative A.

Riparian buffers

Alternative D would use the same riparian buffer prescription as Alternative A.

Roads

Roads proposed for use include open Forest system roads; closed roads; unclassified, abandoned roads (remnant of historic logging activities); and new temporary roads.

The list below is a breakdown of approximate mileage by road classification and post-harvest treatment. More information on the roads proposed for use may be found in Appendix C.

33.8 miles of existing, open Forest system roads would be used and kept open post-project.

These roads would be maintained at standards necessary for safe timber haul during project implementation.

1.2 miles of existing, open Forest system roads would be used and then closed following project implementation. If funds are available, these roads may be decommissioned as proposed in the Olympic National Forest Access and Travel Management (ATM) Plan.

0.1 mile of closed forest system road would be reopened for use and then closed following project implementation. If funds are available, this road may be decommissioned as proposed in the Olympic National Forest Access and Travel Management (ATM) Plan.

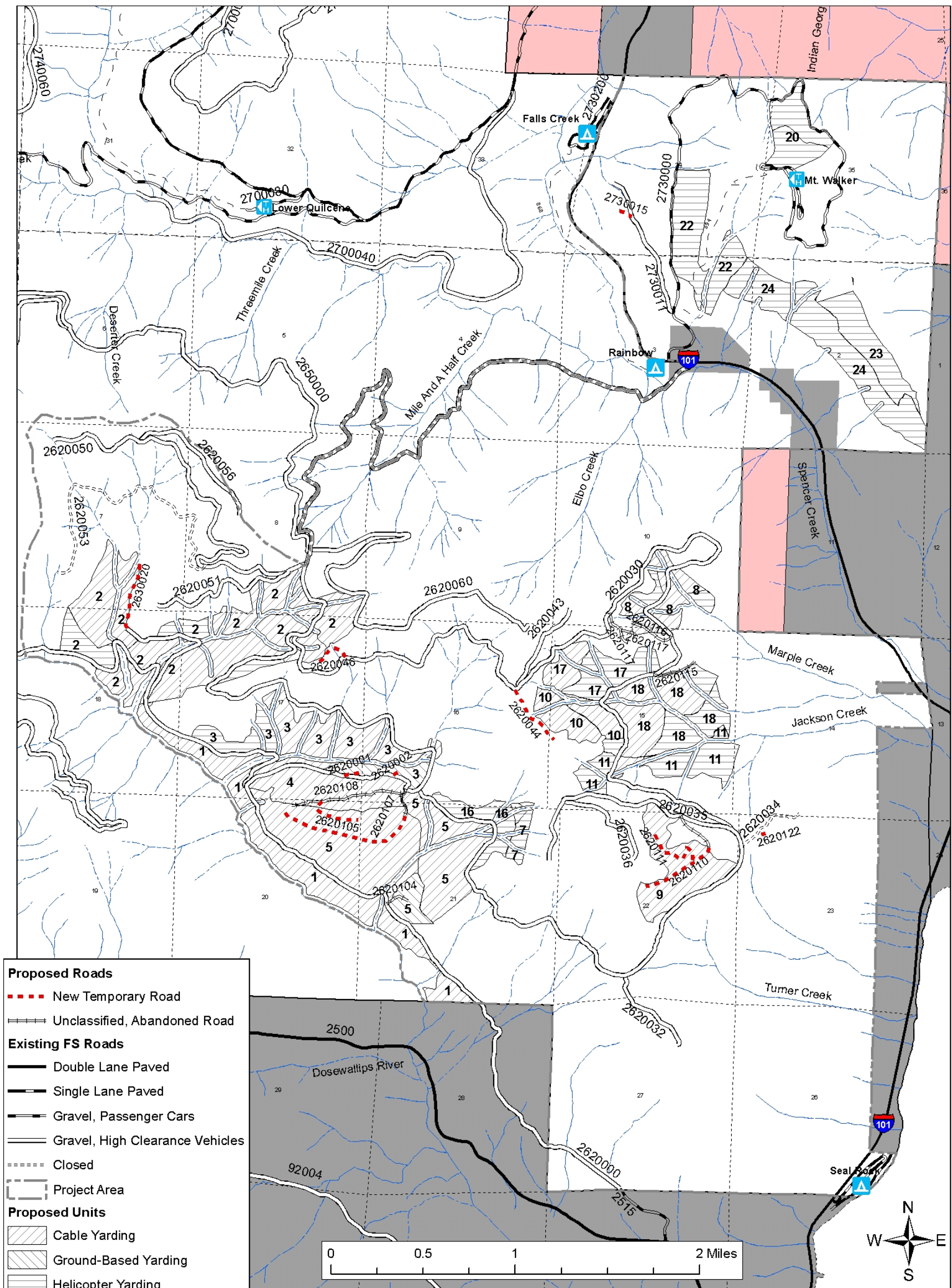
2.0 miles of unclassified, abandoned road would be used and then decommissioned following project implementation.

3.2 miles of new temporary road to be constructed and then decommissioned following project implementation.

Short, temporary spur extensions of approximately 100 feet in length would be made as necessary off of system roads for public and worker safety purposes or to assist cable yarding operations. These spurs, estimated to total less than a mile under any alternative, would be decommissioned and blocked from vehicle access following project implementation.

Reconstruction of existing open roads to bring them to a standard for safe log haul may include work that would also improve drainage and/or fish passage.

Figure 13. Map of Alternative D.



- Proposed Roads**
- New Temporary Road
 - Unclassified, Abandoned Road
- Existing FS Roads**
- Double Lane Paved
 - Single Lane Paved
 - Gravel, Passenger Cars
 - Gravel, High Clearance Vehicles
 - Closed
- Proposed Units**
- ▨ Cable Yarding
 - ▩ Ground-Based Yarding
 - ▬ Helicopter Yarding
- Other Ownership**
- Private
 - Washington State

Temporary road locations and lengths are approximate and may differ from actual project layout and implementation.



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Project Design Criteria

Project design criteria were developed to reduce potential negative impacts the action alternatives may cause to resources. These design criteria apply to all action alternatives. Management requirements and best management practices are also included.

Botany

- Survey and Manage Plant. Establish a 200-foot radius no treatment buffer around the occurrence of roundleaf orchid (*Plantanthera orbiculata* var *orbiculata*) in Unit 11 to maintain canopy cover and microsite conditions. Use directional felling to prevent trees from falling into the no treatment buffer to minimize disturbance to the forest floor and reduce damage to the canopy of the buffer.
- Survey and Manage Bryophyte. Establish a 100-foot radius no-treatment buffer around the occurrence of *Tetraphis geniculata* in Unit 6 to maintain canopy cover, microsite conditions, and the structural integrity of the occupied substrate. Use directional felling to prevent trees from falling into the no-treatment buffer surrounding *Tetraphis geniculata* in Unit 6 to minimize disturbance to existing down logs and reduce damage to canopy.
- Sensitive Lichen. Establish a 75-foot radius no-treatment buffer around the occurrences of *Usnea longissima* in Units 1, 2, 5, 16, and 20 to protect the populations during the thinning operation and ensure the availability of adjacent substrate. Use directional felling to prevent trees from falling into the no-treatment buffer surrounding *Usnea longissima* to minimize disturbance to occupied and adjacent substrates. Also buffer any tree that is subsequently found with this lichen.

Fisheries

The following requirements serve to minimize and mitigate impacts to fish habitat.

- Follow all applicable general provisions listed in Appendix A of the Memorandum of Understanding (MOU) between the Washington Department of Fish and Wildlife and USDA Forest Service, Pacific Northwest Region, Regarding Hydraulic Projects Conducted by USDA Forest Service, Pacific Northwest Region (January 2005). Additional specific project provisions found in Appendix A, such as permanent culvert installation and replacement, permanent culvert removal, culvert debris removal, and timber felling and yarding will be followed.
- All instream³ work will occur between July 15th and August 31st for streams in the Rocky Brook Creek drainage and July 15th to October 31st for streams in the Jackson, and Spencer Creek drainages, which is set forth in Table 1, Appendix D of the MOU. Other timing may be allowed on a site-specific basis if the Forest Service fisheries biologist and

³ Intermittent streams that are dry and are anticipated to remain dry during project activities are not subject to work period, unless fish biologist determines the activities are likely to negatively affect fish.

Washington Department of Fish and Wildlife Area Habitat Biologist agree that it would not be harmful to fish and fish habitat.

- Trees felled in no-cut riparian buffers, due to yarding operations will be left in stream or riparian area.
- Leave all existing wood in streams or wetlands unless designated for removal by a fisheries biologist.
- Any machinery maintenance involving potential contaminants (e.g., fuel, oil, hydraulic fluid) will occur at an approved site or greater than 100 feet from wetlands or stream channels.
- Metal culverts removed from stream crossings and ditches will be transported off-site by the contractor to be recycled, reused or disposed of at a landfill.
- Outsloping of the roadway surface is preferred unless outsloping would increase sediment delivery to streams or where outsloping is infeasible. Route road drainage away from potentially unstable channels and hillslopes.
- A watershed specialist or fish biologist shall be consulted prior to modifying any of the project design criteria that could impact aquatic resources.

Fuels

The following requirements serve to minimize risk of fire in areas of possible ignition sources and near areas such as adjacent to private property, and allow quick containment of any fires that may occur.

- Activity slash will be minimized in a strip 66 to 150 feet wide along all system roads used in the project area that will be open to motorized vehicle use after project completion. Buffer distances will be dependent on site specific conditions, as determined by a fuel specialist, but uphill sides of roads and areas closer to private land would generally have a wider fuel treatment buffers than downhill sides of roads. A treatment buffer will also be placed along boundaries of treated units that are adjacent to private land. Riparian no-cut areas, however, will not be treated. In these fuel treatment buffers, the final target fuel load will average six tons per acre or less and an average fuel depth of one foot for 1-hour (< 0.25 inch diameter), 10-hour (0.25 inch to 1 inch diameter), and 100-hour (1-3 inch diameter) fuel sizes. Treatments to achieve this fuel loading may include directional falling to prevent the accumulation of activity slash in the specified buffer widths, transporting remaining activity slash back into the units, and/or piling and burning. Since nitrogen is usually limited in the project area, burning of slash would be limited where possible, since extensive slash burning could raise a concern regarding future nutrient recycling. Residual trees will be protected where possible from heat and smoke damage, if piling and burning is needed.
- Landing slash will also be treated. Some methods may include redistributing slash along skid trails, allowing firewood gathering, and piling and burning.

- On Mt. Walker, the preferred method of disposing of landing slash will be to chip and disperse the slash over a wide area or yarding the slash back into the units or end hauling the slash to another location, such that the slash is not obvious to the casual visitor. If chipping and end hauling is unfeasible, an alternative method will be to pile and burn the landing slash. Any resulting unburned slash will be scattered back into the units, and the landing burn piles will then be rehabilitated and seeded.
- Any burning will be done in compliance with the 1998 Washington State Smoke Management Plan.

Heritage/Cultural Resources

- All new roads will be surveyed after construction by a Forest Service archeologist or cultural resource technician. If subsurface archeological evidence or previously unidentified cultural resources are located during implementation of this project, activities will cease pending an evaluation of cultural significance by a qualified archeologist, who will determine appropriate mitigation measures, if any. The Forest will fulfill its consultation requirements in accordance with 36 CFR 800.11.

Invasive Plants

- Project design criteria in this section include standards set forth in the October 2005 Record of Decision for the Pacific Northwest Region Invasive Plant Program: Preventing and Managing Invasive Plants Final Environmental Impact Statement (USDA 2005b).
- When approved, follow standards in the Olympic National Forest Site-Specific Invasive Plant Treatment Environmental Impact Statement (under development).
- To reduce the spread of invasive plants, 1) designate equipment cleaning areas and wash equipment before it enters the National Forest (contract provision B6.35) and 2) use weed-free hay, straw, seed mixes, or other materials for erosion control, if available.
- Survey for presence/spread of invasive plants at least once within three years of the project's completion, and treat any new infestations of concern, as funding allows.

Recreation/Visuals (for Alternatives A, C, and D unless otherwise noted)

- Under Alternatives A, B, C, and D, notify the public through news releases to local newspapers and visitor centers of changes to existing road access in the Rocky Brook area due to the project implementation.
- For public safety, enact and enforce a Forest Subpart B order to close the road to the top of Mt. Walker (Forest Service Road 2730) and the Mt. Walker trail (trail #894) to public access during active logging operations in Units 20, 22 and the north portion of unit 23.
- Notify the public of dates that will affect the use of Mt. Walker Road and trail. This will be done one to two weeks in advance of any changes to the use of the road or trail. This includes closures and open dates related to the logging operation.

- News releases to Olympic Peninsula, Kitsap County, and Seattle newspapers, radio stations, and visitor centers.
- Signage at the base of the road and viewpoints will include
 - Purpose and need of thinning operation.
 - Method of logging and how it meets the purpose and need.
 - Notice of closure dates of Mt. Walker Road and Trail.
 - Alternative recreation opportunities available in the area.
- Protect the Mt. Walker road from damage from log hauling operations and cable logging. If damaged, restore the road to operational maintenance level 3 following use.
- To minimize management activity effects of this project upon the visual and the recreation resource:
 - Leave a no-cut buffer area of 66 feet on either side of the Mt. Walker trail. Directional fall trees away from the trail. Repair any damage to the trail caused by the logging activity.
 - Maintain a visually closed canopy on Mt. Walker.
 - Minimize the width of skyline corridors. Locate skyline corridors, so that drivers do not look directly down one at the T-intersection at the summit of Mt. Walker.
 - Minimize the disturbance to the Mt. Walker road cutbank.
 - Do not build roads within the visual foreground zone (0-0.5 miles) of the Mt. Walker Road.
 - Minimize disturbance within 100 feet of the road to discourage social trails and other unwanted use from developing in openings created from cable logging in the foreground zone at the summit of Mt. Walker.
 - Flush cut stumps within 100 feet of the Mt. Walker trail and the Mt. Walker road to maintain visual quality.⁴
 - Perform clearing and maintenance work on the Mt. Walker trail before allowing public access following project implementation.⁴

Riparian Areas

- Directionally fall trees away from buffers to protect riparian vegetation from damage. Retain trees accidentally felled into buffers to minimize stream sedimentation or damage to riparian vegetation. Some trees may be removed as determined by a fisheries biologist or watershed specialist.
- Locate post-harvest canopy openings at least 100 feet from flood plains and stream valley floors to maintain conifer trees in the stream-influence zone.

⁴ KV project required as part of mitigation.

- Where cable yarding is planned, design logging systems to yard away from stream channels to minimize soil disturbance on stream-adjacent slopes. If this strategy is not feasible, maintain full suspension of logs over streams.
- Do not locate any helicopter landings within designated riparian no-cut buffers to protect water quality and riparian values.
- Design fuel treatment activities to minimize disturbance to riparian vegetation (Refer to the Northwest Forest Plan standards and guidelines FM-1, 3, 4, and 5 on pp. C-35, 36). Fuel management activities will not occur within no-cut buffers adjacent to wetlands or riparian areas. Contract provision 5.74 Slash Treatment Requirements (2/2002) will be included in the timber sale contract.
- Locate skid trails a minimum of 25 feet from the topographic break into riparian no-cut buffers. Skidding equipment will be kept 66 feet back from streams and wetlands.

Roads, Landings, and Skid Trails

The following requirements for roads, landings, and skid trails serve to minimize and mitigate resource damage, particularly to soil and water, as well as to ensure safety.

- Adhere to timber sale contract clause C5.1 – Temporary Road and Landing Construction, which states that in addition to the requirements of B5.1 and B6.63, Purchaser and Forest Service will agree to the design, construction, maintenance, closure, and obliteration of all Temporary Roads.
- The reopening of old skid trails and temporary roads shall be used where possible and as approved by Sale Administrator in lieu of the construction of new roads if they are located in areas that would prevent sediment delivery to streams.
- All new temporary spurs shall be located and designed to minimize disruption to natural hydrologic flow paths and sediment delivery. Design appropriate drainage for each road site. Route road drainage away from potentially unstable channels and hillslopes.
- Unless prohibited by other project design criteria, new temporary road construction, reopening unclassified and Level 1 roads will occur during the dry season (June through October) or upon approval of the Timber Sale Administrator to minimize surface erosion and sedimentation. Ensure that roads have proper drainage prior to log haul. If roads are left open through extended wet weather, ensure the maintenance of erosion and sedimentation control measures. During operation on these roads outside the normal operating season, spot rock as needed to reduce off-site erosion and sedimentation risk.
- Purchaser should winterize temporary roads prior to winter rains. Purchaser is responsible for monitoring and maintenance of functional road drainage.
- Construct temporary roads to contour with the terrain and roll grades where possible to reduce clearing limits and excavation. Consider curves to eliminate geometric patterns created by roads. On soft soils, use puncheon (small logs) where appropriate within the road surface for strength and drainage, as well as reducing fill material needed. Minimize

clearing widths to what is necessary for safe haul (generally widths of 16 ft on level ground, 20 ft. for curves, and slightly more for steeper grades).

- Decommission temporary roads after last entry by purchaser. Methods may vary, but as a standard, roads will at least receive treatments of backblading, waterbars, culvert removal, and barriers to vehicular traffic. Pullback of fills may be necessary and the original slope returned to grade. Further activities can be used to achieve full decommissioning. These methods include deep subsoiling, the return of all disturbed coarse woody debris, and the placement of slash such that it is contiguous with the surrounding debris. Stumps may also be placed on decommissioned roadbeds. Use CT5.1 (Option 1) Temporary Road and Landing Construction.
- Subsoil compacted and rutted soils in landing areas as necessary to the depth of the rut, plus six inches to provide seedbed. Restore disturbed coarse woody debris. Pull back excavated material on slopes to re-establish the slope for erosion control as needed.
- On skid trails where rut depth exceeds 10 inches, the following actions will be required: 1) subsoiling the full width of the trail to the depth of the rut plus six inches, 2) returning all displaced soils on adjacent berms and any excavated material to the skid trail to approximate original soil contours, 3) replacing any disturbed large coarse woody debris as closely as possible to its original position, and 4) placing slash and stumps onto the trail so that it is contiguous with the surrounding area. Install erosion control devices such as backblading and waterbars, as necessary, on all other skid trails.
- Place vehicular barriers at road or skid trail junctions to prevent public usage. Closed roads, decommissioned temporary roads, safety spurs, and skid trails would be water barred as necessary and be made impassable to motor vehicles and all-terrain vehicles following project implementation.
- Ground-based equipment shall generally be limited to slopes less than 30% for ground-based tractors and 40% for mechanical harvesters (unless otherwise approved by the soil scientist) to minimize soil disturbance and shall be confined to designated skid trail systems approved by the timber sale administrator. Skid trails should not exceed 15 feet in width and would have slash placed on them prior to use by equipment whenever possible.
- No operation of off-road ground-based equipment will be permitted between November 1 and May 31 without the approval of a Timber Sale Administrator after consulting a soil scientist. This restriction may be waived if soils are dry or frozen, or if operators switch to skyline or other non-ground based system. This will reduce the potential for compaction, deep rutting, displacement, and surface runoff.
- Space ground-based skid trails no closer than 110 feet apart, center-to-center. Use existing skid trails where possible. If a processor is used, it may be allowed to make one crossing between skid trails and occasional “pokes” off the skid trail, using existing openings between trees. Avoid locating skid trails in wet areas and near snags 17+ inches dbh.

- Use existing landings where possible. Build skyline cable and helicopter landings in areas away from streamcourses, wet areas, and unstable cutbanks. Use short landing extensions to reduce and control potential run-off.
- Landings in riparian reserves will, if possible, be located on existing roadways that do not require expansion of the road prism or on existing landings that may require only minimum reconstruction (e.g., clearing vegetation, sloping for drainage, or surfacing for erosion control purposes) to be made suitable for use.
- Mulch and replant newly constructed helicopter landings that remove conifers following use. Mulching with weed-free straw or natural slash and coarse woody debris will be used unless waived by the Sale Administrator.
- Require one-end suspension for skyline cable and ground-based inhaul. Avoid yarding across streams and wetland areas. If yarding across streams is necessary, logs must be fully suspended over creeks and the immediate slope above creeks to the break in the topography or end of riparian vegetation. Locate skyline corridors to use natural openings in riparian areas where possible. No ground-based skidtrails are allowed through streams.
- If ground-based logging systems are used, use designated skid trails to maintain less than 20% of the stands' area in an adversely impacted condition (USDA 1990a, p. IV-52). Where soil is displaced by skidding operations, pull soil back into the skid trail location when operations are completed.
- Leave unmerchantable portions of cut trees in units. Within ground-based yarding units, place slash from landing on skid roads to reduce the risk of erosion, compaction and runoff and other adverse soil conditions, as well as provide wildlife habitat.
- Where necessary, erosion control measures, such as seeding and mulching, will be implemented on disturbed soils as soon as possible after operations are completed.
- If the purchaser's plan of operations includes log haul between November 1 and May 31, the Forest aquatic specialist and Timber Sale Administrator will review the purchaser's plan to prevent sediment from entering stream channels. This may include placing additional road surfacing, rock armoring ditches, constructing silt fencing, and straw mulching exposed soils along cutbanks and fillslopes.
- If winter haul is to occur, place additional surfacing/rock at stream crossings, especially along FSR 2620 and 2630 which directly flow into Rocky Brook and other fish-bearing stream crossings.
- Install sufficient relief pipes on temporary roads to divert flow before it reaches stream channels.

Safety

- All Occupational Safety, and Health Administration (OSHA), Federal Aviation Administration (FAA), Washington State Department of Labor and Industries, and other applicable regulations will be followed.

- Where logging safety is jeopardized, snags may be felled, but must be left on-site as coarse woody debris.

Vegetation/Habitat

The following requirements serve to retain desirable habitat components in the thinned stands.

- A 20-inch dbh upper diameter limit for cut trees will be designated for all LSR units. Mt. Walker Units 20, 21, 23, and 24 will have an upper diameter limit of around 24-inch dbh; and Unit 22 will have an upper diameter limit of around 26-inch dbh. The objective of these limits is to achieve greater spatial heterogeneity in the thinned stands. If trees over this size limit are cut for cable corridors, landings, or any other reason, they must remain on site as coarse woody debris.
- Coarse woody debris existing on the site prior to treatment exceeding 6 inches in diameter may be moved for access, but will not be removed from the site. Minimize disturbance and reduction of coarse woody debris from logging activities. Temporary roads and skid trails will be blocked after logging to conserve coarse woody debris that might otherwise be removed for firewood. Keep big, old stumps intact wherever possible – avoid uprooting.
- Logging operations are restricted during bark slippage (March 1 to July 30) to prevent scarring to residual trees. A standard of at most 5% of stems exceeding 16 square inches of damage and 7% total stems damaged will be in effect during all operations. Operations can be allowed to proceed during bark slippage as long as the above standards are met. Damaged trees will not be removed by the logger, but left alive to potentially develop rot columns over time. They may have future value as cavity nester habitat.
- Keep cable corridors and roads out of skips and away from snags when possible.
- Where identified, legacy snags greater than or equal to 30 inches dbh would be buffered in layout with a no-cut area a minimum of 1.5 times the height of the legacy snag (to meet safety requirements).
- Limit skyline corridors to 12 feet in width and include guy trees as part of the thinning prescription to reduce impact to residual stand. Tail trees that are damaged during operations will contribute to snags or coarse woody debris on site.
- Reforest newly constructed cable and helicopter landings where there would be insufficient natural reseeding or where resource concerns warrant.
- Reforest root rot gaps with root rot resistant hardwood species (estimated to total 12-15 acres).
- Protect seeps (small areas with hydrophytic vegetation where subsurface water reaches surface), rock outcrops (small areas of exposed bedrock) and shallow (<10 inches deep) soils, and meadows by:

- Directional falling away from these areas,
- Avoiding placement of skyline corridors through these areas,
- Buffer seeps and springs by 150 feet if larger than ¼ acre,
- Avoid headwalls,
- Buffer rock outcrops and shallow soil/rock outcrop complexes 150 feet if greater than 2 acres in size,

Wildlife

- Helicopter operations in units proposed for helicopter logging must occur only between August 6 and February 28 to minimize noise harassment of late-successional species that may be occupying suitable habitat within one mile of the units, unless otherwise approved by the district wildlife biologist in cooperation with the U.S. Fish and Wildlife Service. Helicopter operations for quieter helicopters that have a 92 decibel output are restricted to this time period only if they operate within 300 yards of suitable habitat. This applies to helicopter harvest units as well as to log and service landings.
- Falling and heavy equipment operation can take place outside of this time window (August 6 – February 28), except for Units 1, 2, 3, 6, 7, 8, 9, 10, 11, 16, 18, and 20, where activities in those portions that are within 65 and 35 yards (respectively) of suitable habitat must take place between August 6 and February 28.
- In units adjacent to suitable murrelet habitat (Units 1, 2, 3, 6, 7, 8, 9, 10, 11, 16, 18, and 20), project activities creating noise disturbance above ambient levels, such as chainsaws, yarders, and heavy equipment, shall not commence until two hours after sunrise and shall cease two hours before sunset from April 1 through September 15.
- Burning during the early breeding season for spotted owls (March 1 to July 15) or early breeding season for murrelets (April 1 to August 5) will be conducted at least 0.25 miles away from suitable nesting habitat (This may affect portions or all of Units 1, 2, 3, 6, 7, 8, 9, 10, 11, 16, 18, and 20). Burning during the nesting season for bald eagles (January 1 to August 15) or during the wintering period (October 31 to March 15) will be conducted at least 1 mile away from any bald eagle use area (Currently no units affected).
- If an active raptor nest is located during thinning operations, contact the Forest Service wildlife biologist for appropriate mitigation measures.
- Protect and retain trees with inactive raptor nests to provide nesting quarters for opportunistic (non-nest building) raptors.
- Falling, yarding, and road construction will not occur within 0.25 mile of known, active fisher denning sites between March 15 and May 31.

- Buffer individual and small groups of residual large, old trees or potential murrelet nest trees found in Units 1-9, and 21, as identified by Forest Service personnel. Leave an unthinned radius of 100 feet around these residuals, as recommended by the Forest Service wildlife biologist and the U.S. Fish and Wildlife Service to maintain microclimate conditions around them.
- Additional selected trees with potential cavities, platforms for other wildlife, and other similar features of wildlife value that are identified as no-cut trees by the Forest Service wildlife biologist or designee would be retained in units. They may, however, be felled where needed to provide for safety and operations such as road construction, and yarding corridors, but would be left on site as coarse woody debris.
- As stated in the programmatic Biological Opinion (USDI 2003), no suitable habitat of the marbled murrelet or northern spotted owl will be removed or adversely impacted from new or temporary road building. This includes individual potential nest trees and any other remnant old-growth trees identified by the Forest or District wildlife biologist or an appointed designee.
- For any old remnant trees or potential marbled murrelet nest trees within the boundaries of units within marbled murrelet critical habitat (Units 1-8 and 16), no road building, yarding corridors or other vegetation removal will occur within the 100 foot buffer around individuals or groups of those trees.
- Yarding and road building will be avoided wherever possible within the 100 foot buffer around those remnant old trees or potential marbled murrelet nest trees in units that are not located in the marbled murrelet critical habitat unit, and will only be permitted upon review of a Forest Service Wildlife Biologist.
- Hazard tree removal that includes the removal of a tree at least 21 inches dbh within suitable marbled murrelet or suitable spotted owl habitat during the early murrelet breeding season (April 1 – August 5) or early spotted owl breeding season (March 1 – July 15) will require review by a Forest Service Biologist (USDI 2003).
- Any proposed removal of any tree larger than 36 inches dbh for road construction will require Forest Service wildlife biologist review (USDI 2003).
- Any removal of dispersal habitat within spotted owl designated critical habitat, for road construction, will require further review (Level 1) (USDI 2003).

Table 2. Monitoring and Adaptive Management Actions Common to Action Alternatives⁵.

Resource Area	Monitoring	Who	Adaptive Management
Heritage Resources	Note any previously unknown heritage resource sites discovered during project planning, layout or implementation. Following project implementation, resurvey 15% of thinned areas.	Forest Service workers on the project, heritage resource specialist	Report new sites to the appropriate District Heritage Resource Specialist who will determine mitigation needed. Stop work until cleared by specialist.
Plant and Animal Species of Concern⁶	Note new populations of federally listed, Survey and Manage, or Sensitive species discovered during project planning, layout or implementation. Active spotted owl, marbled murrelet, or bald eagle nests found during breeding seasons will result in an immediate shutdown of operations within the harassment distances as outlined in Table G-1, G-2, or G-3 of the August 2003, amended 2004, Programmatic Biological Opinion. Develop and implement a monitoring plan to document the <i>P. orbiculata</i> var <i>orbiculata</i> 's response to the thinning project several years beyond project implementation.	Forest Service Specialists on the Project	Report new sightings to the appropriate District Biologist who will determine mitigation needed. Stop work until cleared by biologist or standard buffers are implemented.
Fish	Walk roads to be closed and/or decommissioned following use but before closure. Develop criteria for stream bottom widths following road decommissioning if road impacted stream bottom.	Hydrologist/ Fish Biologist	Develop stream rehabilitation specifications for road decommissioning following use.
Invasive Plants	Survey for presence/spread of invasive plants.	Botanist or Botany Technician	Identify and treat noxious weed populations of concern.
Soils	Ensure adverse detrimental soil conditions do not exceed 20% of each unit the project area following treatment. Ensure EA mitigations are implemented.	Timber Sale Administrator	Increase spacing between skid trails/skyline corridors, wet areas Use all available contract administration tools on closures.

⁵ Monitoring is dependent on available funding.

⁶ Species of Concern are those listed under the State or Federal Endangered Species Acts or Regional Forester's Sensitive List. Additional species of concern may be noted by the US Fish and Wildlife Service.

Resource Area	Monitoring	Who	Adaptive Management
Vegetation/ Habitat	<p>Review sale area for snag density and coarse woody debris coverage 3 to 5 years after harvest.</p> <p>Review sale area post-thinning to ensure that stands still meet the definition of dispersal habitat (11 inch average dbh trees and 40% canopy cover).</p>	Forester/ Wildlife Biologist or Technician	<p>Develop vegetation treatments as needed using the most current analytical tools (such as DecAid).</p> <p>Adjust thinning prescriptions in future projects.</p>

Potential Additional Restoration/Improvement Opportunities

A portion of revenue from timber sale receipts often may be retained to do resource enhancement work in the sale area. Below is a list of restoration opportunities that were identified in the planning area and that may be implemented, depending on the amount of funds generated from the sale. Funds generated from timber sale receipts vary greatly. Funds collected from current timber sale receipts at the time of writing ranged from \$0 - \$400,000, and averaged about \$200,000 per timber sale. Priority for implementation in a given sale area would be determined by the Responsible Official. This list merely identifies restoration opportunities in the project area. Estimated costs for activities, if known, are noted in parentheses.

Aquatics/Fish Passage

- Culvert replacement for resident fish passage on Forest Service Road 2630 at milepost 0.3 (\$300,000)
- Conifer release and understory riparian planting along Rocky Brook with a focus on future large woody debris recruitment (\$8,000)

Invasive Plants

- Treat and monitor invasive plants in high-disturbance areas (i.e. temporary roads and cable and helicopter landings) for several years following the harvest.
- Restore high disturbance area (i.e. temporary roads, and cable and helicopter landings) with native vegetation, if weed species are preventing native species from colonizing the site.

Recreation

- Vegetation removal to restore vistas at the north and south viewpoints on Mt. Walker (\$4,000)
- Interpretive signs showing vistas (\$20,000)
- Replace or remove toilets at North end viewpoint/upper trailhead parking (\$20,000)

- Connect north and south viewpoints of Mt. Walker with a trail (\$8,000)
- Improve picnic sites with new picnic tables on Mt. Walker (\$3,000)
- Interpretive signs of the history of Mt. Walker (\$8,000)
- Brochure of Mt. Walker (\$2,000)
- Improve barrier free access to Mt. Walker viewpoints (\$1,500)
- Improve safety of road by widening road and turnouts
- Enlarge and improve lower parking area, potentially to allow for trailer drops.

Roads

Decommission the following Forest Service roads to improve hillslope hydrology and watershed condition :

- 2630020 (\$25,000)
- 2620030 (\$12,500)
- 2620032 (\$5,000)
- 2620034 (\$3,500)
- 2620035 (\$4,800)
- 2620051 (\$12,000)
- 2620053 (\$24,000)

Road Upgrading and Stabilization

- 2730011 closure and removal of drainage structures (\$4,500)
- 2620-000, 2630000 culvert upgrading (non-fish passage) (\$120,000)

Silviculture

Table 3. Opportunities for Precommercial and Understory Thinning (~\$250/acre).

Acres	Origin yr.	Activity	Priority ⁷	Fiscal Year Planned	Nearest Unit	Remarks
21	1989	PCT ⁸	1	2010	3	
18	1978	PCT	1	2010	10	
7	1978	PCT	1	2010	10	
13	1979	PCT	1	2010	17	
10	1988	PCT	1	2010	8	
13	1985	PCT	1	2010	8	
34	1935	UST ⁹	1	2010	11	
10	1984	PCT	1	2010	8	
3	1983	PCT	1	2010	8	Adjacent to a larger unit
18	1980	PCT	2	2010	7	
22	1988	PCT	2	2010	3	
10	1984	PCT	2	2010	6	Drops out of Alt. B
9	1984	PCT	2	2010	9	
5	1983	PCT	2	2010	11	
23	1980	PCT	2	2010	2	
20	1981	PCT	2	2010	22	Drops out of Alt. B
5	1984	PCT	2	2010	22	Drops out of Alt. B
Total acres = 241						

Wildlife

- Snag/wildlife tree creation (\$192,000)
- Coarse woody debris structures
- Forage seeding/conifer/hardwood planting on decommissioned roads or temp roads (\$3,500)

⁷ Priority levels: 1- Need identified from field recon; 2 - Need identified from age class info, not verified.

⁸ PCT = Precommercial Thinning

⁹ UST = Understory Thinning

Summary Comparison of Alternatives¹⁰

	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Timber					
Total Acres (and percentage of planning area) proposed for thinning/ acceleration of old-growth characteristics	0 (0%)	2,313 (22%)	1,606 (15%)	2,313 (22%)	1,956 (19%)
Acres proposed for thinning in AMA	0	943	415	943	766
Acres proposed for thinning in LSR	0	1,370	1,191	1,370	1,190
Acres proposed for thinning in Riparian Reserve	0	884	754	884	797
Acres proposed for thinning in fire-regenerated stands / on Mt. Walker ¹¹	0	528	0	528	351
Acres proposed for ground-based logging	0	126	50	26	50
Acres proposed for cable logging	0	1,406	1,253	812	1,245
Acres proposed for helicopter logging	0	781	303	1,475	611
Wildlife					
Northern spotted owl, northern spotted owl designated critical habitat, marbled	No change from current condition.	Accelerate the development of 2,313 acres of suitable habitat.	Accelerate the development of 1,606 acres of	Accelerate the development of 2,313 acres of suitable habitat.	Accelerate the development of 1,956 acres of suitable habitat.

¹⁰ Values given are approximate and based on computer mapping and other calculations. These values may differ from actual project layout and implementation.

¹¹ Indicator of significant issue #1: potential harm to the natural development of fire-regenerated stands & #2: potential impacts to the recreational experience on Mt. Walker

	No Action	Alt. A	Alt. B	Alt. C	Alt. D
murrelet, and marbled murrelet designated critical habitat (ESA effects determination)	(No Effect)	(May Affect, but Not Likely to Adversely Affect)	suitable habitat. (May Affect, but Not Likely to Adversely Affect)	(May Affect, but Not Likely to Adversely Affect)	(May Affect, but Not Likely to Adversely Affect)
Sensitive wildlife species effects determination	No direct effect	<p>For all action alternatives: No impact to Mazama pocket gopher, common loon, and American peregrine falcon.</p> <p>Short-term: may impact individual Pacific bald eagle, Pacific fisher¹², Townsend's big eared bat, Olympic torrent salamander, Cope's giant salamander, and Van Dyke's salamander, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.</p> <p>Long-term: Improved habitat for Pacific fisher in thinned areas</p>			
Effects on Sensitive / Survey and Manage mollusks (Sensitive species effects determination)	No effect	<p>For all action alternatives: No impact to Hoko Vertigo snail.</p> <p>No Survey and Manage mollusks were found during pre-disturbance surveys in stands where restrictions apply, except for the Burrington's jumping slug, which is locally common and abundant.</p> <p>(May impact individuals of the Puget Oregonian snail, Malone's jumping slug, blue-gray taildropper slug, evening fieldslug, Burrington's and warty jumping slugs, but no risk to species viability or trend toward federal listing.)</p>			
Effects on Management Indicator species	No effect.	<p>For all action alternatives: Short-term negative impacts from disturbance and loss of small snags. Benefits to deer and elk from increased forage and optimal cover. Long term snag and down wood creation.</p>			
Forest land birds	No change from existing condition.	<p>No direct effects for all action alternatives, except potential for mortality of ground nesting birds in areas of road construction. Indirect effect of increases and decreases in presence of different bird species in thinned areas.</p>			
Roads¹³					
Total miles of open, system road used and kept open	0	33.3	28.9	33.8	33.8
Total miles of open, system road used and closed	0	1.2	1.2	1.2	1.2

¹² While habitat is present in the project area, no known populations of fishers exist in Washington, and it is thought that the species is extirpated from the state.

¹³ Indicators of significant issue #3: potential impacts to aquatic conditions through road-related sedimentation

	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Miles of closed forest system roads to be used and reclosed	0	0.1	0.1	0.1	0.1
Miles of unclassified, abandoned road used in Riparian Reserve and decommissioned	0	0.4	0.4	0.1	0.2
Total miles of unclassified, abandoned road used and decommissioned	0	2.4	2.4	0.4	2.0
Miles of new temporary road in Riparian Reserve used and decommissioned	0	0.7	0.5	0.0	0.5
Total miles of new temporary road constructed and decommissioned	0	3.8	3.1	0.4	3.2
Total number of new stream crossings	0	5	3	0	0
Soils					
Risk to slope stability	No change from existing condition.	Low risk from thinning.	Effects would be similar to Alt. A, except for the deletion of one new, 0.8 mile temporary road that does not pose slope stability concerns.	Low risk from thinning, No new temporary road construction on unstable landforms.	Low risk from thinning, No new temporary road construction on unstable landforms.
Proportion of project area in detrimental soils condition	~4.5%	< 8.7%	< 7.2%	< 6.4%	< 5.7%

	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Aquatic habitat and fisheries					
Temperature	Maintain	Maintain	Maintain	Maintain	Maintain
Sediment	Maintain	For all action alternatives: Degrade at the project level. Maintain at the watershed scale.			
Substrate embeddedness	Maintain	For all action alternatives: Degrade at the project level. Maintain at the watershed scale.			
Pool quality	Maintain	Maintain	Maintain	Maintain	Maintain
Streambank condition	Maintain	Degrade at the project level. Maintain at the watershed scale.	Degrade at the project level. Maintain at the watershed scale.	Maintain	Maintain
Drainage network increase	Maintain	Degrade at the project level. Maintain at the watershed scale.	Degrade at the project level. Maintain at the watershed scale.	Maintain	Maintain
Road density and location	Maintain	Maintain	Maintain	Maintain	Maintain
Riparian reserves	Maintain	Restore at the project level. Maintain at the watershed scale	Restore at the project level. Maintain at the watershed scale	Restore at the project level. Maintain at the watershed scale	Restore at the project level. Maintain at the watershed scale
Effects determination for federally listed and proposed threatened fish species	No effect.	The effects determination for all action alternatives for Puget Sound Chinook, Hood Canal summer chum, Coastal Puget Sound bull trout, and Puget Sound steelhead is “May Affect, but Not Likely to Adversely Affect”. Additionally, associated Critical Habitat for Puget Sound Chinook and Hood Canal summer run chum salmon would also be “May Affect, but Not Likely to Adversely Affect” for all action alternatives. The effects determination for bull trout is “No Effect.”			
Sensitive species effects determination	No effect.	May impact individuals or habitat for Puget Sound/Strait of Georgia coho salmon, Puget Sound/Strait of Georgia chum salmon, and Puget Sound coastal cutthroat trout, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.			

	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Botany					
Effects on federally listed vascular plants, bryophytes, fungi, or lichen species	No effect for all alternatives.				
Effects on Sensitive/ Survey and Manage vascular plant species (Sensitive species effects determination)	No effect for all alternatives. (No risk to species viability or a trend toward listing)				
Effects on Sensitive/ Survey and Manage bryophytes (mosses and liverworts) (Sensitive species effects determination)	No effect for all alternatives. (No risk to species viability or a trend toward listing)				
Effects on Sensitive/ Survey and Manage fungi (Sensitive species effects determination)	No effect for all alternatives. (No risk to species viability or a trend toward listing)				
Effects on Sensitive/ Survey and Manage lichen (Sensitive species effects determination)	No effect for all alternatives. (No risk to species viability or a trend toward listing)				
Effects on Invasive Plants	No change.	For all action alternatives, required mitigation and treatment would provide positive results in preventing spread and treating existing infestations.			

	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Recreation					
Impacts to recreation on Mt. Walker, estimated duration of closure to public access, and amount of time before disturbance not evident ¹⁴	No change from current management.	Closure to public access during project implementation on Mt. Walker, which is estimated to be 75% of the travel season for vehicle and trail access during the first yr., 33% vehicle travel season and 25% of the trail travel season for yrs 2 and 3. Disturbance may be evident to the casual visitor for 1-2 yrs. Improved diversity of vegetation over long term.	No change from current management.	Closure to public access during project implementation on Mt, Walker. Closure period is estimated to be 25% less than Alt. A for all travel. Disturbance may be evident to the casual visitor for 1-2 yrs. Improved diversity of vegetation over long term.	Closure to public access during project implementation on Mt, Walker. Closure period is estimated to be 25% less than Alt. A for all travel. Disturbance may be evident to the casual visitor for 1-2 yrs. Improved diversity of vegetation over long term.
Visual quality					
Compliance with Forest Plan visual quality objectives on Mt. Walker	Compliant - No change from existing condition.	Compliant. Thinning activities would not be evident to the casual visitor from travel routes or Mt. Walker summit. Landings and cable corridors may be discernable for ~1 yr.	Compliant - No change from existing condition.	Compliant. Thinning activities would not be evident to the casual visitor. Landings and cable corridors may be discernable for ~1 yr.	Compliant. Thinning activities would not be evident to the casual visitor. Landings and cable corridors may be discernable for ~1 yr.
Economics					
Estimated volume (MBF)	0	32,406	22,504	32,410	27,426

¹⁴ Indicator of significant issue #2: potential impacts to recreational experience on Mt. Walker

	No Action	Alt. A	Alt. B	Alt. C	Alt. D
Estimated value of wood products	0	\$2,325,891	\$1,866,149	\$1,567,849	\$1,970,963
Estimated implementation costs	0	\$1,062,871	\$738,112	\$1,063,002	\$899,534
Net present value (value – cost)	0	\$1,263,020	\$1,128,037	\$504,847	\$1,071,429
Benefit/cost ratio	0	2.19	2.53	1.47	2.19
Heritage Resources					
Effects on Heritage Resources	No effect.	No effect for all action alternatives. There are no known cultural properties in the proposed treatment area.			