Appendix A: Proposed Treatments Descriptions

Detailed descriptions of proposed actions are separated by the main treatment types (vegetation thinning, prescribed fire, wildlife habitat enhancement, aquatic habitat enhancement, and transportation and trail management.

Vegetation Treatments

Prescriptions were prepared by Eireann Pederson, Silviculturist, and Carissa Camenson, Forester (Methow Valley Ranger District) and focus on modifying or maintaining structure stages to achieve a diverse array across the project area. Figure 12 provides a visual depiction of each forest structure class, while Table 23 describes each class and how it is used by wildlife focal species.

Figure 1. Forest structure classes (O'Hara et al. 1996, Hessburg et al. 2000

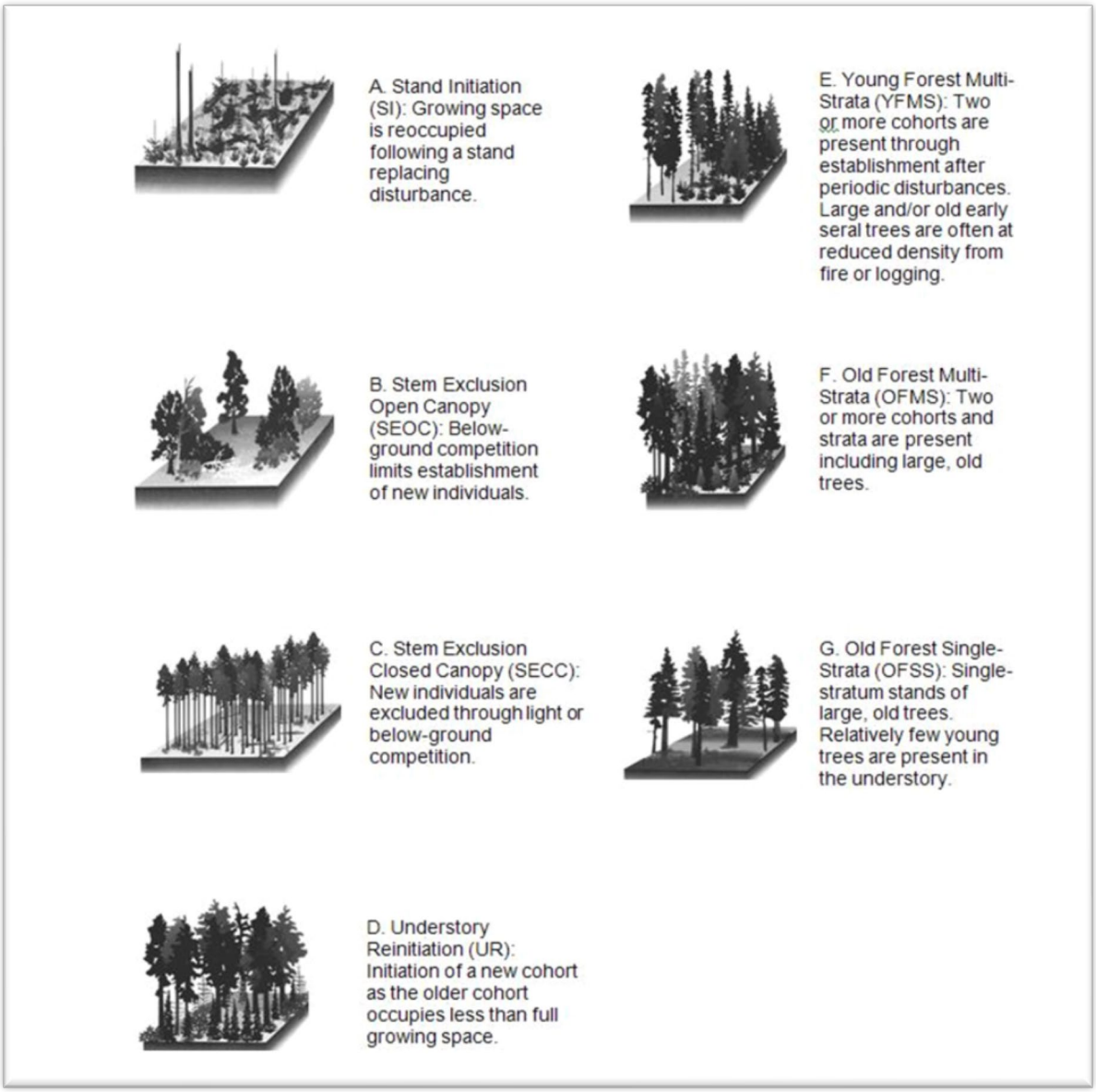

Table 1. Structural class descriptions and key functions for focal wildlife species (USDA 2012).

Structural class	Description	Key functions for focal wildlife species
Stand initiation (SI)	Single canopy stratum (may be broken or continuous); one cohort, seedlings or saplings; grasses, forbs, shrubs may be present with early seral trees.	Black-backed woodpecker – source habitat if created by fire and not salvage harvested.
Stem exclusion open canopy (SEOC)	One broken canopy stratum; one cohort; trees excluding new stems through competition; poles, small or medium trees; understory shrubs, grasses, forbs may be present.	White-headed woodpecker – habitat may be provided depending on cover of large trees and cover of understory.
Stem exclusion closed canopy (SECC)	Continuous closed canopy; one or more canopy strata; one cohort; lower strata, if present, are same age as upper strata; poles, small or medium trees; understory shrubs, grasses, forbs may be present.	Northern spotted owl – dispersal habitat
Understory Re-initiation (UR)	Broken overstory canopy; >2 canopy strata; two cohorts; overstory is poles, small, or medium trees; understory is seedlings, saplings, or poles.	Northern spotted owl – high-quality habitat depending on the canopy closure and size of overstory trees. Northern goshawk – source habitat depending on the canopy closure and size of overstory trees.
Young-forest multistory (YFMS)	Broken overstory canopy; >2 canopy strata; >2 cohorts; large trees are absent in the overstory; stands are characterized by diverse horizontal and vertical distributions of trees and tree sizes; seedlings, saplings, poles, and medium trees are present.	Northern spotted owl – high-quality habitat depending on the canopy closure and size of overstory trees. Northern goshawk – high-quality habitat depending on the canopy closure and size of overstory trees. White-headed woodpecker – habitat may be provided depending on cover of large trees and cover of understory.
Old-forest multistory (OFMS)	Broken overstory canopy; >2 canopy strata; >2 cohorts; large trees dominant in the overstory; stands characterized by diverse horizontal and vertical distributions of trees and tree sizes; all tree sizes may be present.	Northern spotted owl – high -quality habitat Northern goshawk – source habitat

Structural class	Description	Key functions for focal wildlife species
Old-forest single story (OFSS)	Broken or continuous canopy of large, old trees; one stratum, may be single but usually multi-cohort; large trees dominate the overstory; understory absent or seedlings or saplings; grasses, forbs, or shrubs may be present in the understory.	White-headed woodpecker – source habitat

Table 21 lists the current structure classes within the project area and the acres associated with each. Currently, young forest multistory (YFMS) covers approximately 46% of the project treatment area. Other classes such as old forest multistory (OFMS) are lacking across the project area.

Table 2. Structure stages within the Twisp Restoration Project area.

Structure Class	Acres
Stand Initiation (SI)	1,156
Young Forest Multi Story (YFMS)	27,296
Stem Exclusion Closed Canopy (SECC)	2,464
Stem Exclusion Open Canopy (SEOC)	11,738
Understory Re-initiation (UR)	5,802
Old Forest Multi Story (OFMS)	542
Old Forest Single Story (OFSS)	90

Thinning Prescriptions

Proposed vegetation treatments are shown in Figures 15-17, Appendix D. Alternative 2 includes three tools for treating vegetation in this project:

- Understory thinning removes trees too small to be of commercial value to reduce live ladder fuels, removes competition with larger diameter trees, and reduces stocking levels in plantations;
- Overstory thinning prescriptions reduce stocking levels and crown density, remove diseased trees, and create openings in which seral species may become established;
- Prescribed fire reduces surface fuels, scorches lower branches and increases live crown heights, and reduces young conifer stocking levels.

This section describes the thinning prescriptions proposed in this alternative to meet Needs #1-4; refer to "Prescribed Fire Treatments" below for details on proposed uses of this tool. Thinning treatments are designed to promote stand health, reduce the risk of insect and disease outbreaks, and reduce elevated hazards of stand-replacing wildfire events. Understory treatments would target the removal of trees less than 10" dbh, while overstory treatments would target the removal of commercial-size material (trees greater than 7" dbh). Overstory treatments focus on treating stands with issues related to forest health and resilience to wildfire such as overstocking, undesirable species composition, and disease and insect occurrence. Since the most effective treatments at restoring forest health and resilience to wildfire are the ones that treat both the overstory and understory components while shifting species to larger fire-tolerant

trees (USDA 2012), these treatments include overlapping combinations of overstory and understory treatments. All prescriptions below would be applied only to pre-identified, site-specific locations except for SI Thin and Matrix Thin as described below

Common Prescription Elements

The following information applies to all thinning prescriptions as described.

- In this project, "small" trees are defined as ≤ 15.9" dbh, "medium" trees are 16"- 24.9" dbh, and "large" trees are ≥ 25" dbh. These definitions are based on the tree size classes identified in the Ecosystem Management Decision Support (EMDS)landscape analysis completed for this project (Downing 2019).
- Overstory treatments would thin trees from below (i.e. remove trees starting from the understory, then the midstory and lastly the overstory leaving predominately larger diameter trees to achieve desired stand density) and would be designed to promote a mosaic of individual trees, clumps, and openings (ICO):
    - Clumps range in size from small (2-4 trees), medium (5-9 trees), or large (10+ trees).
    - Openings generally ½ to 1 acre in size have no trees present; may increase to 2 acres if insect and disease issues are present as described in Matrix Thin prescription.
- Overstory and understory preferred leave tree species (listed in preference order) include ponderosa pine (PIPO), western larch (LAOC), Douglas-fir (PSME), and lodgepole pine (PICO).
- No western red cedar, whitebark pine, or western white pine would be removed.
- All overstory thinning treatments include reducing conifer competition around aspen by thinning all conifers less than 20" dbh within 50 feet of 5 or more aspen clones taller than 15 feet.
- Forest types within the project area are defined by general temperature/precipitation classifications and dominant species. These include Warm/dry PIPO, Warm/dry PSME, and Cool/moist PSME.

Understory Thinning Prescription: Stand Improvement (SI) Thin

- Thin trees < 10" dbh from below to 50-75 TPA, removing the smallest trees first to achieve desired understory stand structure.

The goal of this prescription is to reduce the density of understory trees < 10" dbh to help restore forest health, desired stand structure, and resilience to wildfire. Areas treated with this prescription may include plantations, areas of natural regeneration, and multistory stands with a substantial "ladder fuel" component. This prescription would be applied in treatment areas outside of overstory thinning units. These treatments would begin after project implementation starts and continue over 15-25 years, generally prioritizing locations within the Wildland Urban Interface (WUI). This treatment would be applied to site-specific locations within FPOG stands, the Sawtooth IRA, LSRs, and RRs. Within the IRA, treatments with this prescription would help restore characteristics of ecosystem composition and structure by thinning dense understory stands and reducing the risk of uncharacteristic wildfire effects by minimizing ladder fuels that contribute to crown fire initiation. On BLM and Matrix lands outside of these areas, this prescription would be applied where the following conditions are met.

Decision Criteria for Stand-Improvement Thin Prescription in Matrix:

- Slope is less than 80% and within one mile of an NFS road
- Forested stand has naturally regenerated or was planted following disturbance (i.e. wildfire, insect outbreak, or past thinning).
- Current stocking level of trees < 10" dbh exceeds 150 trees per acre.

Overstory Thinning Prescriptions

Several overstory thinning prescriptions are proposed in this project to meet specific goals. Unless specified, these prescriptions would be applied to site-specific (pre-identified) locations in the project area rather than through condition-based decision criteria. These treatments would be accomplished using timing and methods as described below.

Matrix Overstory Thinning Prescriptions

Matrix Thin

- Thin trees up to 30" dbh from below to 20-40 TPA in size classes >10" dbh. Trees 25-29.9" dbh would be evaluated for removal only if they have a dwarf mistletoe rating (DMR) ≥ 2 (Hoffman 2004) and are within 30-40 feet of a larger healthy uninfected preferred leave tree species with a minimum of 18" dbh.
- Understory treatments to remove trees <10" dbh may also be applied with a targeted residual density of 50-75 TPA in the <10" dbh size class.

The purpose of this treatment is to create a forested stand structure with individual trees, clumps of trees, and openings (ICO) by creating openings, isolating large old trees as individuals, and creating clumps of various sized trees. Openings would generally range from 1/2 to 1 acre, but may increase up to 2 acres in areas outside of FPOG and IRA where heavy infestations of insect or disease are present, including (but not limited to) dwarf mistletoe infections with an average DMR ≥ 2, root rot, bark beetles, and defoliators. Areas considered for 2-acre openings must have identified insect or disease issues in more than 50% of the trees.

This treatment would be applied in the warm/dry forest type with the desired residual stocking of 20-40 TPA depending on forest type and location. This prescription may also be applied to help maintain stand structure in areas previously harvested in the Twisp Pine Restoration Project; in these stands, the prescription would focus on insect and disease removal along with stocking control. "Tree tipping" (pushing trees over with equipment to provide a tree bole with root wad" would occur on approximately 70 acres in the Little Bridge Creek drainage using this prescription, with the resulting materials used as large wood in aquatic enhancement treatments included in this project (refer to "Large Wood Placement" below for further details). This prescription would be applied at site-specific locations in FPOG to enhance FPOG characteristics by protecting and promoting large and old trees without degrading FPOG status. As stated, trees within the larger size classes would not be targeted for removal unless necessary to protect a larger healthier tree. This prescription would be used in site-specific locations in FPOG. Elsewhere on Matrix lands, this prescription would be applied to no more than 10,840 acres within the "Condition-based management area" identified in Figure 4. These acres would be evaluated using the condition-based criteria below, including in one location within Little Bridge Creek where this prescription would be implemented through "tree tipping".

Decision Criteria for Matrix Thin outside of FPOG:

- Slope is less than 80% and within one mile of an NFS road.
- Current stocking level exceeds 50 trees per acre greater than 7" dbh.
- One of the following stand structures exists: young forest multi story (YFMS), stem exclusion closed canopy (SECC), understory re-initiation (UR), or stem exclusion open canopy (SEOC). (Stand structures are defined in Appendix A.)
- Units thinned with ground-based harvest systems would generally need to provide at least four thousand board feet (MBF) per acre from trees from 7-30" dbh to be commercially viable; 6 MBF per acre for cable/tethered logging systems; and 8-10 MBF for harvest operations using helicopters.
- Areas that do not meet these decision criteria would then be considered for understory thinning (SI Thin) using the decision criterion described above.

Matrix Shaded Fuelbreak Thin

- Thin trees up to 30" dbh from below to 20-30 TPA in size classes > 10" dbh. Trees 25-29.9" dbh would be evaluated for removal only if they have a dwarf mistletoe rating (DMR) ≥ 2 (Hoffman 2004) and are within 30-40 feet of a larger healthy uninfected preferred leave tree species with a minimum of 18" dbh.
- Understory thinning may also occur to remove trees <10" dbh with a targeted residual density of 30-40 TPA in this size class. Snags would also be removed unless designated for retention by the Wildlife Biologist.

The goal of this site-specific prescription is to reduce vegetation and fuel loading at strategic areas along roads and ridgelines in Matrix lands outside of IRAs, RRs, and FPOG to help break the flow of fire and reduce fire intensity. Doing so would help provide a suppression anchor for firefighters and help reduce hazards for public egress and firefighter ingress. This prescription would be applied to specified ridges and along forest system roads with a varying width of no more than 600 feet depending on fuel type, access, and topography.

Regeneration Harvest (Shelterwood with Reserves, Seed Tree with Reserves)

- Thin trees using "Shelterwood with Reserves" or "Seed Tree with Reserves" methods to remove up to 90% of the existing stand infected with insect and disease.

This prescription would be applied to regenerate site-specific stands in Matrix lands where more than 50% of the trees are affected by insect and disease, with the goal of removing infected trees to promote the establishment of a healthy new cohort while retaining an overstory that is less susceptible to insect and diseases. Clear-cutting would not be used to regenerate these stands. Instead, two methods may be used depending on the amount of overstory that could remain uninfected. The "Seed tree with reserves" method would produce a two-aged stand in which some or all seed trees are retained as reserve trees after regeneration has become established to attain goals other than regeneration. Reserve trees may also include those trees that are not expected to provide seed for desirable regeneration. The "Shelterwood with reserves" method would create a two-aged stand in which some or all shelter trees are retained to attain goals other than regeneration. In both methods, the reserve trees generally comprise at least 10% of full stocking after harvest. All areas identified for this treatment would be planted after harvest and fuels

treatments with the desired species, based upon the preferred leave tree species listed above. Desired stocking five years post-harvest would range from 100-150 TPA. To meet this objective, 150-200 TPA may be planted initially. Natural regeneration potential would be assessed when determining how many trees to plant initially.

Late Successional Reserve Prescriptions

The goal of thinning and prescribed fire treatments in the LSR is to reduce the risk of habitat loss from stand-replacing wildfires and insect and disease outbreaks and, where burned by the 2018 Crescent Fire, reduce fuel loading that could elevate the risk of more frequent high-intensity fire that further delays habitat recovery. Outside of the 2018 Crescent Mountain Fire area, fire behavior modeling of LSRs in the project area indicate the strong probability of high flame lengths and elevated hazards of crown fire potential, which are highly associated with high mortality. The Twisp Restoration Project Landscape Evaluation (Downing 2018) identified increased risks for Western Spruce Budworm, Douglas-fir and mountain pine beetle outbreaks.

LSR Risk Reduction Thin

- Thin trees up to 25” dbh from below to 40-50 TPA in size classes >10” dbh. Maintain a minimum 40% canopy cover (CC). Maintain or create snags > 10” dbh with a goal of 2 snags per acre. Trees 21-24.9” dbh would be evaluated for removal only if they have a dwarf mistletoe rating (DMR) ≥ 2 and are within 30-40 feet of a larger healthy uninfected preferred leave tree species with a minimum of 18” dbh.

- Understory thinning may occur to remove trees <10” dbh with a targeted residual density of 50-75 TPA in this size class.

This prescription would be applied to site-specific locations in the Sawtooth and Upper Methow LSRs to reduce the risk of habitat loss to wildfires and insect and disease outbreaks. This prescription may also be applied to pre-identified stands of FPOG. While CC may be reduced by this treatment in the short term, it would likely increase over time as the residual stand responds to treatment by tree canopies expanding into the available growing space. Areas designated as FPOG would not be degraded and would still meet the Forest Plan definition. FPOG characteristics would be enhanced by protecting and promoting large and old trees through this prescription. Trees within the larger size classes would not be targeted for removal.

LSR Shaded Fuelbreak

- Thin trees up to 25” dbh from below to 20-30 TPA within the 10”-25” dbh size classes. Maintain a minimum 40% canopy cover (CC). Maintain or create snags > 10” dbh with a goal of 2 snags per acre. Trees 21-24.9” dbh would be evaluated for removal only if they have a dwarf mistletoe rating (DMR) ≥ 2 and are within 30-40 feet of a larger healthy uninfected preferred leave tree species with a minimum of 18” dbh.

- Understory thinning may occur to remove trees <10” dbh with a targeted residual density of 30-40 TPA in this size class.

The goal of this site-specific prescription is identical to “Matrix Shaded Fuelbreak” but modified for LSRs to retain larger trees and provide for greater canopy cover. Where this treatment would be applied through northern spotted owl nesting and roosting habitat, the Fuelbreak width would be decreased to 200 feet wide. Snags would also be removed unless designated for retention by the Wildlife Biologist.

Owl Habitat Improvement Thin

- Thin conifers up to 24.9" dbh from within 50 feet of the bole of large and old trees (>25" dbh). Trees 21-24.9" dbh targeted for removal within the 50 feet would be evaluated based on a DMR ≥2. Clumps of medium trees (18-21" dbh) may be designated as leave trees to retain multistory canopy layers.

- Trees >10" dbh outside the designated clumps and the 50-foot treatment circles around large trees would be thinned to 50 TPA or a density that maintains a minimum 60% CC.

- Understory treatments outside the 50-foot treatment circle may also be applied to remove trees <10" dbh, retaining 20-30 TPA in the <10" dbh size classes.

This prescription would be applied in designated FPOG stands and nesting and roosting habitat areas within the LSR as described in the wildlife report. This treatment would maintain multiple canopy layers where appropriate to provide adequate habitat for LSR-dependent species such as the northern spotted owl. Removing understory competition from beneath the current large and old overstory would help maintain these large and old tree legacies on the landscape.

Firewood Salvage Thin

- Thin snags up to 25" dbh. Retain all snags >25" dbh and all green trees. If no snags >25" dbh are present, the next largest available size class would be retained to meet the desired 2-4 snags per acre

The goal of this prescription is to reduce the hazard of the projected high fuel loading following the Crescent Mountain Fire (2018) in select areas with high mortality. These areas would be planted post-harvest and post fuels treatments with the desired species based upon the preferred leave tree species listed above. Desired stocking 5 years post-harvest would range from 100-150 TPA. To meet this objective 150-200 TPA may be planted initially. Natural regeneration potential would be assessed when determining how many trees to plant and may preclude planting if stocking is adequate.

Inventoried Roadless Area Prescriptions

These site-specific prescriptions are proposed to improve threatened, endangered and proposed sensitive habitats and maintain and restore ecosystem composition and structures as describe in Chapter 3. All treatments within the IRA would meet or enhance roadless characteristics described in 36 CFR 294.11.

Inventoried Roadless Area Thin:

- Thin conifers up to 16" dbh from below to 5-10 TPA in the <16" dbh size classes.

The goal of this prescription is to thin small trees from below to shift stand structures from a densely stocked young forest to a more open older forest structure similar to the historic range of variability, reducing the risk of stand-replacing wildfire and encourage growth amongst the residual trees to protect and promote larger trees. Trees larger than 16" dbh would not be removed unless for safety purposes.

IRA Riparian Reserve Thin

- Thin trees up to 16" dbh from below to 20-30 TPA within the 10"-16" dbh size classes. Maintain a minimum 40% canopy cover (CC). Maintain or create snags > 10" dbh with a goal of 2 snags per acre.

- Understory treatments to remove trees <10" dbh may also be applied to create a targeted residual density of 20-30 TPA in the <10" dbh size class.

IRA Firewood Salvage Thin:

- Thin snags up to 16" dbh. Retain all snags >16" dbh and all green trees. If no snags >16" dbh are present, the next largest available size class would be retained to meet the desired 2-4 snags per acre

This prescription has the same goals as "Firewood Salvage Thin" but is adapted to removed small-diameter trees. Trees >16" dbh would not be removed trees unless necessary for safety purposes. Areas thinned with this prescription would be planted after harvest and fuels treatments with the desired species based upon the preferred leave tree species listed above. Desired stocking 5 years post-harvest would range from 100-150 TPA. To meet this objective 150-200 TPA may be planted initially. Natural regeneration potential would be assessed when determining how many trees to plant and may preclude planting if stocking is adequate.

Riparian Reserve Prescriptions

Riparian Reserve prescriptions would focus on improving riparian reserve habitat by controlling stocking densities to promote large and old trees, maintaining and improving understory shrub species, maintaining multiple layers, and providing shade and nutrients into the riparian system. In doing so, these treatments, thereby would meet or enhance Aquatic Conservation Strategy objectives by maintaining and restoring species composition and structural diversity of plant communities in riparian areas.

Riparian Reserve Thin

- Thin trees up to 25" dbh from below to 40-50 TPA within the 10"-25" dbh size classes. Maintain a minimum 40% canopy cover (CC). Maintain or create snags > 10" dbh with a goal of 2 snags per acre. Trees 21-24.9" dbh would be evaluated for removal only if they have a dwarf mistletoe rating (DMR) ≥ 2 and are within 30-40 feet of a larger healthy uninfected preferred leave tree species with a minimum of 18" dbh.

- Understory treatments to remove trees <10" dbh may also be applied to create a targeted residual density of 50-75 TPA in the <10" dbh size class.

Aquatic Restoration Trees

- Fell select trees < 25" dbh along the Twisp River and Little Bridge Creek drainages.

The goal of this prescription is to use trees along these stream channels as large wood materials during aquatic habitat enhancement treatments included in this project, enhancing stream habitat and regulating water velocity. Trees would be identified by the FS hydrologist, soils scientist, aquatic biologist, and silviculturist. Up to 35-40 trees per mile of stream along approximately 18 miles in these drainages would be hand-felled or winched over with machinery directly into adjacent stream reaches. Tree removal would not result in the loss of stream shading or degrade FPOG or RRs. The preferred species would be Douglas-fir; other species may be considered for removal if this species is not within the treatment area.

Thinning Methods and Timing

Understory thinning of trees using the Stand Improvement Thin prescription would be during the spring through fall months and may begin immediately after a decision is signed, unit layout is complete, and funding becomes available. Work may continue for an estimated 25 years across the project area and would generally be completed by hand, although a masticator attached to low-pressure ground equipment may be used where feasible on slopes up to 45%. These treatments would be implemented by agency personnel, partners, or contractors.

Commercial harvest using the "Firewood Salvage" prescription would likely occur within one year after signing a decision after contract preparation and award before dead trees become unsound and lose value as firewood. This treatment would be completed by purchasers or their agents and would likely be completed within 2 years after project initiation. Trees selected for the "Aquatic Restoration Trees" prescription may be felled as soon as a decision is signed; work would be accomplished by agency staff or partners or their contractors and would continue for up to five years. These trees would be hand-felled or winched over with machinery directly into adjacent stream reaches. Where overstory thinning prescriptions are implemented through "tree tipping", work may begin after a decision is signed and would be accomplished by agency staff or partners or their contractors and would be completed within 1-2 years. Trees would be pushed over with equipment such as an excavator or cable winch during the spring through fall months, thereby achieving the overstory thinning prescription while also providing whole trees with rootwads attached for use in the aquatic habitat enhancement treatments included in this project. Once "tipped", trees with rootwads would be yarded to landings, where they would be moved to stream channels using a helicopter or an excavator within the next 1-5 years.

The remaining overstory thinning prescriptions would be completed in an estimated five phases of commercial harvest activity in locations as shown in Figure 5. The first phase of commercial thinning may begin immediately after a decision is signed, unit layout is complete, and a sale contract is awarded. Subsequent phases would likely begin at one-year intervals, with commercial thinning in each location lasting 3-5 years per phase, for an estimated total of 15-20 years to complete. Commercial harvest may occur any time of year in the project area except as described below:

- Overstory thinning in Riparian Reserves may only occur in the winter months to protect soil resources unless the purchaser can provide a plan of operations that provides for the same level of soil protection as winter operations (see Design Feature S1, Appendix B). If FS staff approve such operating plans, harvest in designated Riparian Reserves may occur outside of winter months.

- In the Chickadee area, winter harvest would not occur to avoid impacting grooming and use of Nordic ski trails in that area. Harvest operations in areas designated for Riparian Reserve Thin prescriptions in this part of the project area can only occur with a plan of operations approved by FS staff that provides for the same level of soil protection as winter harvest conditions.

- In portions of the project area in the vicinity of Little Bridge Creek, Coal Creek, and Lookout Mountain designated as Forest Plan Management Area 26, logging and post-sale operations would be prohibited December through March to protect deer winter habitat. Logging and post-sale operations would be limited in these areas during June to protect fawning habitat as determined necessary by the district wildlife biologist.

Commercial harvest would generally be completed by purchasers or their agents using ground-based logging equipment on slopes below 35% but may be used on slopes up to 45% (approximately 75% of the

total acres proposed for overstory thinning). This logging system uses a feller-buncher to cut trees and a skidder to bring them to the landing. Skidders are usually rubber-tired with a grapple but may have tracks in place of wheels or cable chokers in place of a grapple. Trees are skidded to the landings with limbs and tops attached, known as whole tree yarding. Ground-based logging may also include the use of a cut-to-length harvester and a forwarder. With this option, felled trees are limbed, topped, and cut to log length in the harvest unit. The limbs are placed in the trails used by harvester/forwarder equipment to reduce ground pressure and soil compaction. The logs are then taken to a landing using a forwarder. Either of these ground-based systems may be used during commercial harvest proposed in this project on slopes up to 45% if their use complies with design features to minimize soil compaction described in Appendix B. Ground-based commercial treatments must be operationally feasible and would generally require a road and suitable landing at the bottom of the unit. Stands must have a minimum of 4 thousand board feet (MBF) per acre for this system to be economically viable. However, some stands with volume as low as 1,000 board feet per acre may also be considered for ground-based treatment to address forest health issues.

Skyline or cable logging would be used to implement overstory thinning prescriptions on the approximately 25% of these acres that lie on slopes above 35% with roads located at the top of these units. This system uses hand fallers with chainsaws to cut the trees, limb and top the trees in place, and buck them into log length. Chokers attached to a carriage, pulled by hauling cables, runs along a skyline cable providing vertical lift to the logs. The logs are pulled up the slope by a yarder with at least one end of the log suspended. Stands must have a minimum of 6 MBF per acre for this system to be economically viable.

Tethered logging uses winch-assisted cut-to-length harvesters, feller bunchers, skidders, and forwarders specifically designed to operate on slopes that normally require skyline logging. The winch and cable attached to the equipment help control the equipment as it goes down the slope and assists it as it goes up slope. The winch system either mounts to the working equipment or it is mounted to another piece of equipment, like a dozer, that also acts as the anchor. When mounted to the working equipment, the winch line is anchored to an anchor point, such as a stump or the base of a standing tree, somewhere on the slope. The mechanical influence of the winch is used for enhanced traction and mobility on steep slopes (often called “traction assist”) or for safety on steep slopes (preventing machine sliding and overturning). To meet operational and economic constraints, these stands would generally need to be able to provide 5,000 board feet per acre of conifers greater than 7” dbh.

Helicopter logging may be used on steep slopes when there is no road access to the timber stand being harvested. This system uses hand fallers with chainsaws to cut the trees and limb, buck, and top the trees in place. Chokers attached to the helicopters are set and the logs are flown to a landing. This logging system requires removing 8-10 MBF per acre minimum to justify the cost. While this project includes helicopter-only harvest on approximately 2031 acres, it is unlikely that these would be implemented given current haul distances to a processing facility and market conditions for forest products. However, if there are changes in demand for forest products, new processing facilities open closer to the project area, or funds become available to subsidize the cost of harvest, these acres may be implemented. Acres of proposed commercial harvest shown as skyline could also be harvested by helicopter if, for example, a proposed temporary road could not be built.

Fuel Reduction Treatments

Fuel reduction treatments described in this section include firewood gathering, biomass removal, and prescribed fire activities.

Debris Removal

LSR Firewood Gathering

Portions of the project areas within Matrix already allow for firewood gathering according to the current firewood removal guide for NFS lands on the Methow Valley Ranger District (USDA FS 2016). After project implementation begins, personal public firewood gathering would be allowed within designated areas in the Twisp River LSR within 200 feet of the uphill side of the main access roads (FSRs #44, 4440, 4435, and 4430) and within 200 feet of both sides of spur roads accessing trailheads (Figure 25, Appendix D). Work would be accomplished by members of the public using chainsaws and would occur during the spring through fall months. The purpose of this treatment is to help reduce dead and downed materials created by wildfires and over 25 years of insect and disease mortality, and to help diminish emissions from prescribed burning that would otherwise be used to reduce these materials. Select snags and large woody debris would be marked for retention by district staff and monitored yearly to assure retention of these features. All other firewood restrictions in the current firewood removal guide would apply to this activity, such as restrictions on felling snags and removing firewood within specified distances of streams, ponds, or wetlands. This activity would begin in the first year of project implementation and continue unless yearly monitoring of snag levels by district staff indicated that snag levels were below desired levels; if this occurred, this activity would no longer be authorized.

Debris from thinning treatments would be available for public firewood utilization or biomass removal where it is near an open NFS road; if not removed, it would be piled by hand and then burned as described below. Biomass removal would likely occur in the spring through fall months. If removed for biomass, work would be accomplished by contractors using low-pressure equipment to bring materials to existing roads where it would be loaded with equipment such as an excavator for removal and processing off NFS lands. Biomass removal may also involve removal of landing piles through similar means.

Prescribed Burning

Proposed prescribe fire treatments are shown in Figure 22, Appendix D. This project includes two general types of prescribed fire treatments: piling and pile-burning, and underburning. Piling treatments generally focus on the surface debris created by thinning treatments. This debris would be piled by hand or machine when it is extensive enough to create undesirable fire intensity that threatens the desired stand retention objectives or creates control problems near the boundaries of burn units. In underburn treatments, fire is applied across a broad area to achieve widespread fuel consumption and fire effects. The goal of these treatments is to reduce natural accumulations of debris in unthinned areas, minimize debris created by thinning, reduce tree stocking in the lowest diameter classes, scorch the lower branches of trees to increase canopy base height, and invigorate or encourage grasses, forbs, and shrubs species that are dependent on fire to thrive on the landscape. In most areas, up to three prescribed fire treatments may occur in either site-specific locations within LSRs, FPOG, RRs, and IRAs, or using condition-based criteria on Matrix lands. Where condition-based thinning prescriptions were applied (i.e. SI Thin and Matrix Thin outside of FPOG, IRAs, LSRs, and RRs), pile-burning treatments below would occur to the extent that these thinning treatments occurred using the decision criteria below.

Prescribed burning treatments would begin approximately three years after project implementation began, allowing time for thinning treatments to occur and debris to cure, and extend over the next 30 years as described below. The initial prescribed fire treatment in any location would likely involve piling debris by hand or machine and burning piles 1-2 years after thinning to allow curing). Piling and pile burning would occur as needed where thinning created debris in amounts that would create undesirable fire intensity during underburning that would impact desired retention of overstory trees or create control problems adjacent to burn unit boundaries. An initial underburn would follow pile burning within

approximately 1-3 years in most locations or may be the initial prescribed fire treatment to reduce debris and/or to prepare for replanting where this activity is proposed in regeneration harvest units. Finally, maintenance underburning may occur after the initial underburn treatment when the mean historic fire return interval has passed (approximately 16-20 years for most of the project area) to help maintain desired fuel levels and stand structure.

Prescribed fire treatments proposed in this project would occur on NFS and BLM lands. Pile burning would occur in March – June and September – December, while underburning would occur March – June and September – November. During any given burn season, timing of treatments would be subject to burn plan objectives, environmental conditions needed to meet objectives, availability of staff, funding, and smoke approval. Prescribed fire treatments would use site-specific burn plans that consider the fuel loading and stand structure after thinning treatments were completed. Burn plan objectives would be consistent with design features in Appendix B, with staff review to assure that desired resource objectives are met. Burn operations would follow the current Washington State Smoke Implementation Plan administered by WA DNR to prevent or limit air quality impacts, as described in the Fuels/Air Quality report.

In FPOG stands, IRA, LSRs, and RRs, prescribed fire treatments would be applied at site-specific locations. Within Matrix outside of these land management designations, prescribed burning would be applied using the decision criteria below.

Decision Criteria for prescribed fire treatments in Matrix:
The decision to implement prescribed fire in Matrix lands would be based on the condition of characteristics that influence the frequency, intensity, and severity of wildland fires. Specific prescribed fire prescriptions, including timing and location, would focus on restoring historic fire regimes and creating or maintaining conditions that allow direct attack by firefighters working with hand tools during weather conditions that are common during the peak of the fire season. Typical conditions that would trigger a prescribed fire treatment are as follows:

- ***Pile Burning:*** Within overstory thinning units, machine piling would be used when surface fuel loading following thinning exceeds 10 tons per acre or residual slash exceeds 12 inches in depth. Machine piling or slash dispersal may occur when residual slash exceeds 6 inches in depth within 10 feet of leave trees or 50 feet of prescribed fire control lines where residual slash. This will be followed by pile burning after approximately one year of curing. This activity is subject to other requirements as described in Appendix B (Design Features).

  In Stand Improvement thinning units, hand piling would be used to pile all residual slash, including a portion of the existing dead and down woody debris where needed to prevent woody debris from connecting adjoining piles. This will be followed by pile burning after approximately one year of curing. This activity is subject to other requirements as described in Appendix B (Design Features).

- ***Underburning:*** Following pile burning or where no pile burning is expected, the initial underburn may occur when the time since last fire exceeds the historic mean fire return interval (MFRI, approximately 16 to 20 years for most of project area). Except for areas within the Twisp River, Little Bridge Creek, and Crescent Mtn fire perimeters, most of the project area already exceeds the historic MFRI; in these locations, the initial underburn may occur within 1-3 years after pile burning or immediately after project implementation begins where no pile burning is expected. Maintenance burning may be implemented when the time since last fire exceeds the historic mean fire return interval.

Hand pile and burn

Hand-piling and pile burning would follow Stand Improvement Thin treatments on FS and BLM lands to consolidate and reduce small-diameter debris created by these treatments if the resulting fuel loading would likely create undesirable fire behavior during subsequent prescribed underburning treatments. This treatment may also be used in lieu of machine piling in overstory thinning units where infeasible to use machinery. Hand-piling woody debris generally occurs as trees are thinned and would only occur where debris is small enough to be piled safely and efficiently by hand crews into piles that are typically less than 8 feet wide by 8 feet tall. Piles would be burned usually with a drip torch, fusee, or propane torch generally 8 months to 1 year after piling when the debris has cured enough to allow for complete consumption, and generally occurs in fall months. Given the time-lag between thinning, piling, and curing, pile burning may begin three years after project implementation began and would continue in various locations in the project area for up to 20 years post-decision.

Machine pile and burn

Within overstory thinning units on FS and BLM lands outside of Riparian Reserves, an excavator or similar piece of equipment may create piles on slopes up to 45% to concentrate natural or activity fuel loadings where slash and soil conditions are sufficient to prevent adverse impacts of tracked equipment. Excavator machine piles would generally be 8 feet by 8 feet. Piles would be burned usually with a drip torch, fusee, or propane torch generally 8 months to 1 year after piling when the debris has cured enough to allow for complete consumption, and generally occurs in fall months. Given the time-lag between thinning, piling, and curing, pile burning may begin two years after project implementation began and would continue in various locations in the project area for up to 15-20 years post-decision.

Up to 700 landing sites would be designated as needed at overstory thinning units, using existing landings wherever possible. Piles at landings would average approximately ½ acre each. Approximately half of the landings would be associated with condition-based thinning with the Matrix Thin prescription and would only occur to the extent that this prescription is implemented. Trees removed from units would be brought to landings where equipment strips them of branches and tops prior to transport. This debris would be collected by machinery such as excavators into a large pile ranging from less than ¼ acre to up to 1 acre. Where accessible by an open road, this debris would be available for biomass removal or firewood collection while curing (generally up to one year). After adequate time to cure (generally one year), these piles would be burned by hand usually with drip torches, propane torches, or fusees. Landing piles may be created as soon as commercial harvest activity begins and may continue to be created for up to 15-20 years depending on the pace of commercial thinning operations. Landings would be rehabilitated after burning using methods described in the Table 28 in Appendix B.

Underburning

Underburning treatments use primarily surface fire at generally low intensity levels to reduce existing and activity-created debris to desired levels. Treatments would occur on BLM and NFS lands and may also occur on up to 550 acres of private lands pending landowner approval and completion of required agreements. Where underburning is prescribed to prepare a site for replanting (i.e. in Regeneration Harvest prescription), a more intense fire behavior is desired that creates natural seedlings and planting sites by exposing mineral soil. This treatment generally occurs in March – June and September – November. Underburning would be accomplished by FS staff or partners and would be accomplished by hand ignition (methods include drip torches, propane torches, and fusees), aerial ignition (methods include a sphere dispenser machine or helitorch) or a combination of both. Underburning would occur across the project area in site specific locations within FPOG, IRAs, LSRs, and RRs. Outside of these areas in Matrix lands, this treatment would be applied using the decision criteria below.

Underburn unit boundaries would follow existing roads, trails, and natural fuelbreaks such as rock outcroppings as burn boundaries wherever feasible and safe. Where these features do not exist or are inadequate, hand or machine fireline would be constructed to provide a safe anchor point to contain burn operations to the desired area. Hand fireline would be constructed using chainsaws and hand tools to create a vegetation-free barrier down to mineral soil depth, approximately 12" to 18" wide. Machine fireline would be constructed using chainsaws and mechanized equipment such as a dozer to produce a barrier up to 5-7' feet wide, dug to mineral soil depth. Burn units would be as large as feasible to reduce exposure to firefighters, take advantage of longer periods with good ventilation conditions, and be cost-effective. The amount of fireline proposed in this project would be reduced to the extent that this is possible. In some instances, however, larger units may need to be broken into smaller sections with additional fireline to allow burning during shorter windows of good ventilation, which would result in constructing more fireline up to the maximum amount described in Chapter 2. Fireline would be rehabilitated after use using methods described in Table 28 in Appendix B.

Hydrology/Aquatic Habitat Treatments

In addition to the thinning and prescribed fire treatments described above that would benefit aquatic habitat, the following treatments are included in Alternative 2.

Culvert Replacement and AOP Installation

Culverts replacement and AOP installation may begin as soon as a decision is signed for this project and would be completed by FS staff or partners in the spring through fall months, depending on the site-specific instream work window. This work would continue for up to 20 years till completed. Equipment such as an excavator would be used to remove existing culverts and install larger culverts or AOPs. that would be designed to withstand 100-year storm events and associated debris per WDFW/Region 6 Forest Service MOU (WDFW & USDA 2012) and ARBO II (USDC-NMFS 2013 & USDI – FWS 2013) Design Criteria for instream work). AOPs would be designed to provide full access for all aquatic and riparian dependent species at all life stages. Areas disturbed by work would be rehabilitated as described in the Mitigations table, Appendix B.

Large Wood Placement

Aquatic habitat enhancement treatments proposed in this project involve placing an estimated 6000 pieces of large woody debris > 6-inches diameter in stream channels. Some materials would come from felling trees directly into streams as described under the "Aquatic Restoration Thin" prescription. Other woody material would come from the "Tree Tipping" areas proposed in this project. Most of this material would be brought in from off-forest and stockpiled at specified areas, then transferred to stream reaches via helicopter to create accumulations of 2-40 logs, including engineered log jams (ELJs) that would be placed where mobile wood poses a conceivable risk to downstream values. These structures will be designed to withstand 100-year flood events and may include the use of all-thread or other approved fasteners. ELJs would each consist of 10–40 pieces of large wood, 15"–25" DBH and approximately 40' long. Locally harvested wood and slash will be incorporated into each structure to fill interstitial space and create micro habitats. Locations for log placement would be accomplished in select reaches of the Twisp River, Little Bridge Creek, and Poorman Creek through condition-based criteria described below.

Decision Criteria for Large Wood Placement

- River or stream reach has less than 565 pieces of wood > 6" diameter per mile.

- Specific locations to be considered include below the mouths of tributaries, floodplains (especially those with multiple braided channels), river or stream segments flowing through broad valley floors, below or within deep pools, and at the heads of islands.

Helicopters would be used to fly root wads to remote locations where access from stream banks is not available or would cause unacceptable resource impacts. In select locations, an excavator may be used to reposition aerially transported wood, to improve orientation or to stabilize jams, or to move the wood short distances (<100 yards) between the stockpile and the actual jam location in the river. This technique would minimize heavy equipment movement which will greatly reduce vegetation and soil impacts.

In one location in the Twisp River, approximately 400 cubic yards of river channel would be excavated to create pools that would be maintained by ELJs; most of this material would be deposited around the log jams on the banks, while approximately 100 cubic yards would be removed from the river channel and spread at an existing gravel pit on NFS lands in the project area.

Log stockpiling, helicopter refueling, and equipment staging operations would use existing clearings or gravel pits on NFS lands 150 feet or more from open water or wetland habitats. Approximately 4.4 miles of access routes would provide paths for equipment to reach stream channels at designated locations selected to minimize impacts to riparian habitat. Of this amount, 2.8 miles would be temporary access routes constructed for the project, then decommissioned immediately after use. Another 1.1 miles would use an existing NFS road that is proposed for decommissioning post-project; this would be accomplished as part of this treatment after it was used for access. The remaining 0.5 miles of access would use an existing NFS road. Soil disturbance and vegetation impacts caused by tree tipping and equipment use would be rehabilitated as described in Appendix B under “Mitigations”.

Transportation System and Trail System Changes

Proposed transportation system changes are shown in Figures 18-20, Appendix D. NFS roads are described by operational maintenance levels (Table 22) that describe their intended use. During project implementation, several roads in the project area would be used to access and transport logs from thinning units (“log haul routes”). The timber sale purchase or agent would conduct road maintenance, reconditioning, or reconstruction as needed prior to use to minimize damage to road surfaces during log haul. Some closed roads would be opened for log haul, then would either be closed, decommissioned, or remain open after log haul or the initial prescribed fire underburn. Likewise, some currently open roads that would be used for log haul would be closed or decommissioned in the same manner. Approximately 3 miles of roads on private lands would be used for log haul pending landowner approval and completion of road use agreements with the landowners.

Temporary roads (including select unauthorized roads) would be constructed or improved to the minimum standard needed in pre-identified locations to provide access for overstory thinning treatments, then decommissioned by the timber sale purchaser or agent within approximately 18 months. An exception to this involves two temporary roads totaling 0.6 miles proposed in the Alder Creek area that would be built to access proposed thinning treatments on NFS lands; these roads would be closed after log haul was completed, but left available for up to three years to provide access to adjacent BLM and WA DNR lands, then decommissioned by these agencies after use.

Table 3. NFS Road Maintenance Levels

Maintenance Level	Access	Description
1	Closed to public access	Roads that have been placed in storage between intermittent uses, they are closed to vehicular traffic but may be available and suitable for nonmotorized uses.
2	Open to public access	Assigned to roads open for use by high clearance vehicles
2A	Closed to public access, open to FS staff and permittees.	Road is gated to limit access; otherwise same as ML2 road.
3	Open to public access	Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car
4	Open to public access	Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds

Constructing or improving temporary, unauthorized, and new NFS roads

Temporary roads would be constructed, and unauthorized roads used for haul would be improved in specified locations as needed to access areas for commercial harvest operations. These roads would be constructed or improved to the minimum extent necessary for safe operation by the timber sale purchaser or agent during the period that the timber sale area is active, corresponding to the phases described previously. Roads would be decommissioned within 12-18 months of use depending on location except for two temporary roads in the Alder Creek drainage that also access adjacent WA DNR and BLM lands; these roads would remain onsite but closed as described in Chapter 2 until used by these agencies for log haul.

New permanent road construction would occur within the first 10-15 years after project initiation began and engineering design was completed to access commercial harvest areas. Work would be completed during the spring through fall months by contractors using heavy equipment such as dozers or excavators. Any new materials needed for fill would come from existing rock sources on NFS lands or offsite and would be weed-free. After log haul was completed, new roads proposed for closure would be closed as described below.

Closing NFS Roads

Roads identified for closure would be blocked where they intersect with an open road. FS engineering staff or their designee would determine the type of site-specific actions (i.e. berming or placing boulders needed to create a closure effective at blocking motorized vehicle access. Engineering and hydrology staff would determine whether culverts would need to be removed to restore hydrologic continuity.

Decommissioning NFS, unauthorized, and temporary roads

Road decommissioning may begin as soon as project implementation begins and would occur in the spring through fall months. Work would be completed by contractors, agency staff, or partners as funding became available. Roads needed for log haul would not be decommissioned until after this activity was completed; these roads may be decommissioned by the purchaser depending on the type of timber sale contract used. Roads identified for decommissioning would be evaluated by engineering staff to develop

site-specific prescriptions for light, medium, or heavy decommissioning, with input from other resource specialists as appropriate. Evaluation will consider existing drainage structures, slope stability of fill and cut slopes, signs of erosion, adequacy of vegetation, etc. If no issues are identified that need to be addressed, further decommissioning activities would not be necessary and road records would be changed to indicate the road segment is decommissioned. Existing site conditions for each road segment would dictate light, medium or heavy road decommissioning practices as follows:

- Light decommissioning: block road entrance, decompact road surface, install waterbars, reestablishing former drainage patterns, scatter slash and woody debris, and restore vegetation or other methods designed to meet the specific conditions associated with the road. Generally applies to gentle sideslopes and ridgetop locations and well-established vegetation on stable sidecast fills on gentle sideslopes.

- Medium decommissioning: block the road entrance, remove cross drain culverts and small fills, decompact road surface, pull back road shoulders and place and shape the material into cutbanks, install waterbars, reestablish former drainage patterns, scatter slash and woody debris, and restore vegetation or other methods designed to meet the specific conditions associated with the road. Generally applies to moderate sideslope locations, cross drain culverts and small fills and sidecast fills on moderate sideslopes.

- Heavy decommissioning: block road entrance, remove stream culverts and fills to restore slopes and stream channels to match adjacent conditions upstream and downstream), remove unstable fills and completely eliminate the roadbed by restoring natural contours and slopes, reestablish former drainage patterns, scatter slash and woody debris, and restore vegetation or other methods designed to meet the specific conditions associated with the road. Generally applies to steep sideslope locations and close proximity to streams, stream crossings and large fills, sidecast fills on steep sideslopes and potentially unstable fills.

Decommissioning roads to trail or to stock driveway

Where NFS or unauthorized roads are proposed for conversion to trails or stock driveway, work may begin as soon as any commercial log haul proposed on those roads was completed and funding became available to decommission the road and continue until completed. If the timber sale was implemented through a stewardship contract, the roads may be decommissioned by the timber sale purchaser or agent after overstory thinning treatments were completed. Work would be completed in the spring through fall months by contractors, agency staff, or partners following the light, moderate, or heavy decommissioning methods described above, but leaving adequate passage for stock to assure access by horseback riders (on trails) or stock (on stock driveways).

Table 23 describes the specific changes to each road by its individual segments. These changes are summarized in Chapter 2. Post-project changes to road access are shown in Appendix D, Figures 18-20.

Table 4. Alternative 2 Transportation Changes

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4300000	0.6		ML3	ML3	ML3	ML3
4300250	0.2		ML 1	ML2	ML1	DECOM
4300300	2.7		ML 3	ML2	ML2	ML2
4300300	2.8		ML 3	ML2	ML2	ML2
4300320	0.2		ML 1	ML2	ML1	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4300320	1.5		ML 1	OPEN	OPEN	DECOM
4300322	0.2		ML 1	ML2	ML1	DECOM
4300335	0.3		ML 1	ML2	ML1	DECOM
4300340	0.1		ML 1	ML2	ML1	DECOM
4300360	3.0		ML 2	ML2	ML2	ML2
4300362	0.3		ML 1	ML2A	ML2A	ML2A
4300362	0.6		ML 1	ML2A	ML2A	ML2A
4300479	0.6		ML 1	ML2	ML2	ML1
4300475	1.4		ML 1	ML2	ML2	ML1
4300800	2.1		ML 2	ML2	ML2	ML2
4300800	0.4		ML 1	ML2	ML2	DECOM
4300800	2.9		ML 2	ML2	ML2	ML2
4300810	0.3		ML 1	ML2	ML2	DECOM
4300820	0.5		ML 2	ML2	ML2	ML2
4300825	1.0		ML 1	ML2	ML2	ML1
4300825	0.3		ML 1	ML2	ML2	DECOM
4300830	0.4		ML 1	ML2	ML2	DECOM
4300832	0.1		ML 1	ML2	ML2	DECOM
4300850	0.6		ML 1	ML2	ML2	DECOM
4300855	0.3		ML 1	ML2	ML2	DECOM
4300856	0.2		ML 1	DECOM	ML2	DECOM
4300856	0.9		ML 1	ML2	ML2	ML1
4300857	0.3		ML 1	ML2	ML2	DECOM
4300860	0.4		ML 1	ML2	ML2	ML1
4345100	0.4		ML 2	ML2	ML2	ML2
4345100	5.2		ML 2	ML2A	ML2A	ML2A
4345200	1.8		ML 3	ML3	ML3	ML3
4345210	1.4		ML 2	ML2	PRIVATE	PRIVATE
4345215	0.4		ML 2	ML2	ML2	ML2
4345217	0.3		ML 1	ML2	ML2	DECOM
4345218	0.1		ML 1	ML2	ML2	DECOM
4345225	2.3		ML 2	ML2	ML2	ML2
4345226	0.4		ML 2	ML2	ML2	ML2
4345230	2.0		ML 1	ML2	ML2	ML1
4345230	0.2		ML 1	ML2	ML2	DECOM
4345237	0.5		ML 1	ML2	ML2	ML2
4345245	0.3		ML 2	ML2	ML2	ML2
4345250	0.4		ML 2	ML2	ML2	ML2
4345250	1.1		ML 1	ML1	ML1	ML1

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4345260	1.5		ML 1	ML2	ML1	ML1
4345266	0.3		ML 1	ML1	ML1	ML1
4350100	3.2		ML 3	ML2	ML1	ML2
4350100	0.6		ML 2	ML2	ML1	DECOM
4350114	0.5		ML 1	ML2	ML1	DECOM
4350115	0.3		ML 1	ML2	ML1	ML1
4350116	0.2		ML 1	ML2	ML1	DECOM
4350116	1.8		ML 1	ML2	ML2	ML2
4350125	0.7		ML 2	ML2	ML2	ML2
4350125	1.0		ML 2	ML2	ML2	ML2
4350130	1.2		ML 2	ML2	ML2	ML2
4350135	0.6		ML 1	ML2	ML1	DECOM
4350140	0.5		ML 1	ML2	ML2	ML1
4350160	0.4		ML 1	ML2	ML1	DECOM
4350170	0.6		ML 1	ML2	ML1	ML1
4350170	1.6		ML 1	ML2	ML1	ML1
4350180	0.2		ML 1	ML2	ML1	DECOM
4400000	7.4		ML 4	ML4	ML4	ML4
4400025	1.2		ML 2	ML2	ML2	ML2
4400025	0.4		ML 2	ML2	ML2	ML2
4400025	0.8		ML 1	ML2	ML1	ML1
4400030	0.5		ML 1	ML2	ML1	ML1
4400031	0.3		ML 1	ML2	ML1	DECOM
4400035	0.4		ML 2	ML2	ML2	ML2
4400036	0.1		ML 1	ML1	ML1	PVT
4400039	0.6		ML 2	ML2	ML2	ML2
4400040	0.1		ML 1	ML2	ML1	ML1
4400040	0.3		ML 1	ML2	ML1	ML1
4400043	0.4		ML 1	ML1	ML1	ML1
4400045	0.5		ML 2	ML2	ML2	ML2
4400045	0.5		ML 2	ML2	ML1	DECOM
4400050	1.5		ML 2	ML2	ML2	ML2
4400050	0.4		ML 2	ML1	ML1	STOCK DRVWY
4400075	1.9		ML 1	ML2	ML1	DECOM
4400100	4.8		ML 2	ML2	ML2	ML2
4400105	0.9		ML 1	ML2	ML1	ML1
4400110	0.9		ML 2	ML2	ML2	ML2
4400115	0.3		ML 1	ML2	ML1	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4400120	2.2		ML 1	ML2	ML1	ML1
4400130	0.5		ML 1	ML2	ML1	DECOM
4400140	0.8		ML 1	ML2	ML1	DECOM
4400145	0.4		ML 2	ML2	ML1	DECOM
4400155	0.6		ML 3	ML2	ML3	ML3
4400160	0.1		ML 2	ML2	ML1	DECOM
4400163	0.2		ML 2	ML2	ML1	DECOM
4400165	0.5		ML 2	ML2	ML2	ML2
4400166	0.1		ML 1	ML2	ML1	DECOM
4400210	0.1		ML 2	ML2	ML2	ML2
4400210	0.4		ML 2	ML2	ML2	DECOM
4400217	0.1		ML 2	ML2	ML2	ML2
4400220	0.2		ML 2	ML2	ML2	ML2
4400230	0.7		ML 2	ML2	ML1	DECOM
4410000	4.5		ML 3	ML3	ML3	ML3
4410000	3.9		ML 3	ML3	ML3	ML3
4410015	0.7		ML 1	ML2	ML1	ML1
4410020	1.2		ML 2	ML2	ML2	ML2
4410020	0.8		ML 1	ML2	ML1	ML1
4410040	0.2		ML 1	ML2	ML1	CONVERT TO TRAIL
4410040	0.2		ML 1	ML2	ML1	DECOM
4410050	0.8		ML 1	ML2	ML1	ML1
4410100	2.4		ML 2	ML2	ML2	ML2
4410120	0.2		ML 1	ML1	ML1	ML1
4410200	0.7		ML 2	ML2	ML2	ML2
4410200	2.0		ML 2	ML2	ML2	ML2A
4410220	0.8		ML 2	ML2	ML2	ML2
4410220	0.1		ML 2	ML2	ML1	STOCK DRVWY
NEW CONSTRUCTION / 4410200-2.64R-1	0.7	P4410330	ML 2	ML2	ML2	ML2
4410300	1.1		ML 2	ML2	ML2	ML2
4410320	0.1		ML 2	ML2	ML2	ML2
4410320	0.7		ML 2	ML2	ML2	ML2
4410340	0.7		ML 1	ML2	ML1	ML1
4410345	0.1		ML 1	ML2	ML1	DECOM
4410375	0.8		ML 2	ML2	ML1	ML1
4410375	0.4		ML 2	ML2	ML1	ML1

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4410385	0.1		ML 2	ML2	ML2	ML1
4410400	0.8		ML 2	ML2	ML2	ML2
4410400	0.8		ML 2	ML2	ML1	ML1
4410415	0.2		ML 2	ML2	ML1	DECOM
4410415	0.6		ML 2	ML2	ML2	ML2
4410420	0.1		ML 1	ML2	ML1	DECOM
4410450	0.8		ML 2	ML2	ML2	CONVERT TO TRAIL
4410455	0.3		ML 2	ML2	ML1	ML1
4410460	0.1		ML 1	ML2	ML2	CONVERT TO TRAIL
4410500	1.1		ML 3	ML3	ML3	ML3
4410500	1.0		ML 3	ML2	ML1	DECOM
4410500	0.6		ML 3	ML2	ML2	ML2
4410500	2.7		ML 3	ML3	ML3	ML3
4410520	0.8		ML 1	ML2	ML2	ML2A
4410520	0.8		ML 2	ML2	ML2	ML2
4410522	0.7		ML 2	ML2	ML2	ML2
4410522	0.1		ML 2	ML2	ML2	ML2
4410525	0.1		ML 2	ML2	ML2	ML2
4410530	0.2		ML 2	ML2	ML2	ML2
4410535	1.2		ML 2	ML2	ML1	DECOM
4410550	1.0		ML 2	ML2	ML2	ML2
4410575	0.1		ML 2	ML2	ML2	ML2
4410575	0.1		ML 2	ML2	ML2	ML2
4410580	0.1		ML 2	ML2	ML2	CONVERT TO TRAIL NORDIC
4415000	5.2		ML 3	ML3	ML3	ML3
4415000	1.6		ML 3	ML2	ML1	CONVERT TO TRAIL
4415015	0.2		ML 1	ML2	ML1	DECOM
4415015	1.1		ML 1	ML2	ML1	ML1
4415015	0.6		ML 1	ML2	ML1	ML1
4415020	0.3		ML 1	ML1	ML1	DECOM
4415022	0.3		ML 1	ML1	ML1	DECOM
4415030	0.5		ML 2	ML2	ML2	ML2
NEW CONSTRUCTION / 4415030-0.45R-1	2.0	P4415031		ML2	ML1	ML1

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4415030-0.45R-0	2.0		OPEN	OPEN	DECOM	DECOM
4415032	0.1		ML 2	ML2	ML2	ML2 / ML2A
4415035	0.1		ML 1	ML1	ML1	DECOM
4415040	3.6		ML 2	ML2	ML2	ML2
NEW CONSTRUCTION / 4415040-3.6R-1	0.8	P4415047		ML2	ML2	ML2
NEW CONSTRUCTION / 4415040-3.60R-0	0.8		OPEN	ML2	ML2	ML2
NEW CONSTRUCTION		P4415047		ML2	ML2	ML2
4415042	0.9		ML 1	ML2	ML1	ML1
4415045	0.3		ML 1	ML2	ML1	ML1
4415046	0.5		ML 1	ML2	ML1	ML1
4415060	1.4		ML 2	ML2	ML1	DECOM
4415091	1.6		ML 1	ML2	ML1	DECOM
4415092	0.5		ML 1	ML2	ML1	ML1
4415092	0.5		ML 1	ML2	ML1	DECOM
4415094	0.6		ML 1	ML2	ML1	DECOM
4415100	3.9		ML 2	ML2	ML2	ML2
4415112	0.6		ML 1	ML2	ML1	DECOM
4415115	1.6		ML 1	ML1	ML1	ML1
4415117	0.6		ML 1	ML1	ML1	ML1
4415120	1.0		ML 1	ML2	ML1	ML1
4415125	1.6		ML 1	ML2	ML1	ML1
4415130	0.4		ML 1	ML2	ML1	DECOM
4415140-0.60L-1	0.6			OPEN	DECOM	DECOM
4415150-0.00L-0	1.1			OPEN	DECOM	DECOM
4415175	1.1		ML 2	ML2	ML1	DECOM
4415178	0.1		ML 1	ML2	ML1	DECOM
4415180	1.0		ML 2	ML2	ML1	DECOM
4415191	0.1		ML 1	ML1	ML1	DECOM
4415194	0.1		ML 1	ML1	ML1	DECOM
4415202	0.3		ML 2	ML1	ML1	DECOM
4420000	3.4		ML 3	ML3	ML3	ML3
4420002	0.1		ML 1	ML2	ML2	ML2A
4420020	0.9		ML 1	ML2	ML1	DECOM
4420020	0.2		ML 2	ML3	ML3	ML3
4420020	0.1		ML 2	ML2	ML1	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4420021	0.1		ML 3	ML3	ML3	ML3
4420030	0.3		ML 1	ML2	ML1	ML1
4420040	0.2		ML 2	ML2	ML2	ML2
4420050	0.5		ML 1	ML1	ML1	DECOM
4420050	1.7		ML 1	ML1	ML1	DECOM
4420060	0.2		ML 2	ML2	ML2	ML2
4420070	1.7		ML 1	ML2	ML1	DECOM
4420080	1.5		ML 3	ML3	ML3	ML3
4420085	0.3		ML 1	ML1	ML1	DECOM
4430000	4.3		ML 3	ML3	ML3	ML3
4430012	0.2		ML 2	ML2	ML2	ML2
4430015	0.4		ML 3	ML2	ML2	ML2
4430015	0.2		ML 2	ML2	ML1	DECOM
4430019	0.1		ML 2	ML2	ML2	DECOM
4430100	1.6		ML 3	ML3	ML3	ML3
4430110	0.9		ML 1	ML2	ML1	DECOM
4430115	0.3		ML 1	ML2	ML1	DECOM
4430120	0.1		ML 1	ML2	ML1	DECOM
4430205	0.2		ML 1	ML1	ML1	DECOM
4430207	0.1		ML 1	ML1	ML1	DECOM
4430210	0.2		ML 1	ML1	ML1	DECOM
4430220	0.2		ML 3	ML3	ML3	ML3
4435000	0.2		ML 4	ML4	ML4	ML4
4435000	4.1		ML 3	ML3	ML3	ML3
4435011	0.1		ML 3	ML3	ML3	DECOM
4435011	0.1		ML 2	ML2	ML2	ML3
4435015	0.4		ML 3	ML3	ML3	ML3
4435020	0.3		ML 1	ML1	ML1	DECOM
4435040	0.6		ML 1	ML1	ML1	DECOM
4435050	0.5		ML 1	ML1	ML1	DECOM
4435060	0.1		ML 1	ML1	ML1	DECOM
4435071	0.1		ML 2	ML2	ML2	DECOM
4435080	0.6		ML 2	ML2	ML2	ML3
4435090	0.1		ML 2	ML2	ML2	DECOM
4440000	7.2		ML 3	ML3	ML3	ML3
4440232	0.2		ML 2	ML2	ML1	DECOM
4440330	0.1		ML 2	ML2	ML2	ML2
4440350	0.6		ML 3	ML3	ML3	ML3
4440355	0.3		ML 2	ML2	ML1	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4440362	0.1		ML 1	ML1	ML1	DECOM
4440365	0.1		ML 1	ML2	ML1	DECOM
4440385	0.3		ML 1	ML2	ML1	DECOM
4440395	0.2		ML 3	ML3	ML3	ML3
4440397	0.1		ML 1	ML1	ML1	DECOM
4440410	0.3		ML 3	ML3	ML3	ML3
4440415	0.1		ML 1	ML1	ML1	DECOM
4440440	0.2		ML 2	ML2	ML2	DECOM
4440445	0.2		ML 1	ML1	ML1	DECOM
4440450	0.1		ML 2	ML2	ML2	DECOM
4440455	0.2		ML 2	ML2	ML1	DECOM
4440457	0.1		ML 3	ML3	ML3	ML3
4440460	0.4		ML 2	ML2	ML2	DECOM
4440465	0.1		ML 3	ML3	ML2	DECOM
5005000	4.2		ML 3	ML3	ML3	ML3
5005220	1.3		ML 2	ML2	ML2	ML2
4300800-4.03L-1	0.1		UA	OPEN	DECOM	DECOM
4415030-0.34L-3	1.0		UA	OPEN	DECOM	DECOM
4415190-0.10R-1	0.0		UA	CLOSED	CLOSED	DECOM
4415190-0.02L-1	0.1		UA	CLOSED	CLOSED	DECOM
4415000-4.06R-1	0.1		UA	CLOSED	CLOSED	DECOM
4415042-0.04L-1	0.3		UA	CLOSED	CLOSED	DECOM
4415030-0.34L-2	0.4		UA	OPEN		????
4415015-0.50R-1	0.2		UA	CLOSED	CLOSED	DECOM
4415015-1.00L-1	0.1		UA	CLOSED	CLOSED	DECOM
4415000-1.70R-1	0.1		UA	CLOSED	CLOSED	DECOM
4220050-2.20-1	0.5		UA	CLOSED	CLOSED	DECOM
4300479-0.27R-1	0.1		UA	CLOSED	CLOSED	DECOM
4300800-4.42L-1	0.2		UA	OPEN	DECOM	DECOM
4300800-5.12R-1	0.2		UA	OPEN	DECOM	DECOM
4300800-5.12R-2	0.2		UA	OPEN	DECOM	DECOM
4300825-0.08L-1	0.1		UA	CLOSED	CLOSED	DECOM
4300825-0.18L-1	0.1		UA	CLOSED	CLOSED	DECOM
4300825-0.18L-2	0.1		UA	CLOSED	CLOSED	DECOM
4300825-0.95R-1	0.2		UA	CLOSED	CLOSED	DECOM
4300856-0.22R-1	0.1		UA	CLOSED	CLOSED	DECOM
4300856-0.27L-1	0.2		UA	CLOSED	CLOSED	DECOM
4300857-0.13L-1	0.0		UA	CLOSED	CLOSED	DECOM
4345100-5.42L-1	0.1		UA	CLOSED	CLOSED	ML2A

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4345200-0.14R-1	0.4		UA	OPEN	DECOM	DECOM
4345200-2.28L-1	0.5		UA	CLOSED	CLOSED	DECOM
4345200-2.28R-1	0.1		UA	CLOSED	CLOSED	DECOM
4345200-2.28R-1	0.1		UA	CLOSED	CLOSED	DECOM
4345200-4.14-1	0.2		UA	CLOSED	CLOSED	DECOM
4345200-4.14L-1	1.1		UA	CLOSED	CLOSED	DECOM
4345225-0.72R-1	0.1		UA	CLOSED	CLOSED	DECOM
4345225-0.96L-1	0.6		UA	CLOSED	CLOSED	DECOM
NEW CONSTRUCTION / 4345225-0.96R-1	0.7	P4345223	UA	ML2	ML2	ML1
4345225-1.14L-1	0.1		UA	CLOSED	CLOSED	DECOM
4345225-2.22R-1	0.3		UA	CLOSED	CLOSED	DECOM
4345260-0.44R-1	0.2		UA	CLOSED	CLOSED	STOCK DRVWY
4345260-0.44R-2	0.2		UA	CLOSED	CLOSED	DECOM
4345260-1.16L-1	0.2		UA	CLOSED	CLOSED	DECOM
4345266-0.3-1	0.1		UA	OPEN	DECOM	DECOM
4350114-0.05L-1	0.2		UA	CLOSED	CLOSED	DECOM
4350114-0.05R-1	0.5		UA	CLOSED	CLOSED	DECOM
4350116-1.13R-1	0.3		UA	OPEN	DECOM	DECOM
4350125-0.64R-1	0.4		UA	OPEN	DECOM	DECOM
4350140-0.41L-1	0.5		UA	OPEN	DECOM	DECOM
4350160-0.30L-1	0.2		UA	CLOSED	CLOSED	DECOM
4350170-1.17L-1	0.3		UA	CLOSED	CLOSED	DECOM
4350170-1.60R-1	0.2		UA	CLOSED	CLOSED	DECOM
4350170-1.60R-2	0.1		UA	CLOSED	CLOSED	DECOM
4350170-1.60R-3	0.2		UA	CLOSED	CLOSED	DECOM
4350170-1.79R-1	0.4		UA	CLOSED	CLOSED	DECOM
4400000-3.04L-1	0.1		UA	OPEN	DECOM	DECOM
NEW CONSTRUCTION / 4400000-3.36L-1	0.2	P4400153	UA	ML3	ML3	ML3
4400000-4.55R-1	0.1		UA	OPEN	DECOM	DECOM
4400000-4.99R-1	0.1		UA	OPEN	DECOM	DECOM
4400000-5.04R-1	0.1		UA	CLOSED	CLOSED	DECOM
4400000-5.10R-1	0.1		UA	CLOSED	CLOSED	DECOM
4400000-5.11L-1	0.1		UA	OPEN	DECOM	DECOM
4400000-5.20R-1	0.1		UA	OPEN	DECOM	DECOM
4400000-5.32L-1	0.2		UA	OPEN	DECOM	DECOM
4400000-5.32L-2	0.1		UA	CLOSED	CLOSED	DECOM
4400000-5.47R-1	0.2		UA	CLOSED	CLOSED	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4400000-5.59R-1	0.1		UA	CLOSED	CLOSED	DECOM
4400000-5.61R-1	0.3		UA	CLOSED	CLOSED	DECOM
4400000-5.85R-1	0.1		UA	CLOSED	CLOSED	DECOM
4400000-5.93R-1	0.2		UA	CLOSED	CLOSED	DECOM
4400000-5.93R-1	0.1		UA	CLOSED	CLOSED	DECOM
4400000-6.14R-1	0.2		UA	CLOSED	CLOSED	DECOM
4400000-6.40R-1	0.1		UA	CLOSED	CLOSED	DECOM
4400000-6.97R-1	0.2		UA	CLOSED	CLOSED	DECOM
4400000-6.97R-2	0.3		UA	CLOSED	CLOSED	DECOM
4300476	0.1			ML2	ML1	DECOM
NEW CONSTRUCTION / 4400050-1.50R-1	0.9	P4400053	UA	ML2	ML2	ML2
4400050-1.50R-1	0.3		UA	OPEN	DECOM	DECOM
4300475-1.42L-1	0.4		UA	OPEN	DECOM	DECOM
NEW CONSTRUCTION / 4400050-1.50R-2	0.4		UA	ML2	ML1	ML1
4400050-1.50R-2	0.9		UA	OPEN	DECOM	DECOM
4400050-1.50R-3	0.4		UA	OPEN	DECOM	DECOM
4400050-1.50R-4	0.1		UA	CLOSED	CLOSED	DECOM
4400100-1.81R-1	0.1		UA	OPEN	DECOM	DECOM
4400100-3.12R-1	0.1		UA	CLOSED	CLOSED	DECOM
4400105-0.45R-1	0.7		UA	OPEN	DECOM	DECOM
4400140-0.47L-1	0.6		UA	CLOSED	CLOSED	DECOM
4400145-0.17L-1	0.2		UA	CLOSED	CLOSED	DECOM
NEW CONSTRUCTION / 4410000-1.02R-1	1.2	P4410030	UA	ML2	ML1	ML1
NEW CONSTRUCTION / 4300300-5.27R-1	0.4	P4300361	UA	ML2	ML1	ML1
NEW CONSTRUCTION / 4410000-1.02R-2	0.1	P4410031	UA	ML2	ML1	ML1
NEW CONSTRUCTION / 4410000-1.02R-4	0.1	P4410031	UA	ML2	ML2	ML2
4410000-1.02R-5	1.5		UA	OPEN	DECOM	DECOM
4410000-2.0R-1	0.1		UA	OPEN	DECOM	DECOM
4410040-0.39R-1	0.9		UA	OPEN	OPEN	CONVERT TO TRAIL
4410040-0.39R-1	1.1		UA	OPEN	DECOM	DECOM
4410050-0.03L-1	0.4		UA	OPEN	DECOM	DECOM
4410200-1.0L-1	0.3		UA	OPEN	DECOM	DECOM
4410220-0.38R-1	0.3		UA	CLOSED	CLOSED	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4410300-1.0L-1	0.5		UA	CLOSED	CLOSED	CONVERT TO TRAIL
4410340-0.13L-1	0.2		UA	OPEN	DECOM	DECOM
4410535-0.95L-1	0.0		UA	CLOSED	CLOSED	DECOM
4410550-0.72R-1	0.2		UA	CLOSED	CLOSED	DECOM
4410575-0.05L-1	0.1		UA	CLOSED	CLOSED	ML2
4415000-0.12L-1	0.0		UA	CLOSED	CLOSED	DECOM
4415000-3.80L-1	0.3		UA	CLOSED	CLOSED	DECOM
4415000-5.81R-1	0.0		UA	CLOSED	CLOSED	DECOM
4415040-3.16L-4	0.0		UA	CLOSED	CLOSED	DECOM
4415040-2.66-1 New Construction	0.7	P4415043	UA	ML2	ML2	ML2
4415046-0.21L-1	0.3		UA	CLOSED	CLOSED	DECOM
4415055-0.91L-2	0.3		UA	OPEN	DECOM	DECOM
4415091-1.6-1	0.2		UA	CLOSED	CLOSED	DECOM
4415100-0.16R-1	0.2		UA	CLOSED	CLOSED	DECOM
4415100-0.25L-1	0.2		UA	CLOSED	CLOSED	DECOM
4415140-0.10R-1	0.3		UA	CLOSED	CLOSED	DECOM
4415180-0.05R-1	0.2		UA	OPEN	DECOM	DECOM
4420000-1.28R-2	0.0		UA	OPEN	DECOM	DECOM
4420000-1.49R-1	0.1		UA	OPEN	DECOM	DECOM
4420000-1.49R-2	0.1		UA	CLOSED	CLOSED	DECOM
4420000-1.77R-1	0.0		UA	OPEN	DECOM	DECOM
4420000-1.82L-1	0.1		UA	OPEN	DECOM	DECOM
4420020-0.36L-1	0.1		UA	CLOSED	CLOSED	DECOM
4420020-0.55L-1	0.1		UA	CLOSED	CLOSED	DECOM
4420020-1.10-1	0.1		UA	CLOSED	CLOSED	DECOM
4420020-1.10R-1	0.0		UA	CLOSED	CLOSED	DECOM
4420050-1.10L-1	0.0		UA	CLOSED	CLOSED	DECOM
4420050-1.51R-1	0.1		UA	CLOSED	CLOSED	DECOM
4420050-1.55L-1	0.0		UA	CLOSED	CLOSED	DECOM
4420070-0.31L-1	0.1		UA	CLOSED	CLOSED	DECOM
4420070-0.92L-1	0.1		UA	CLOSED	CLOSED	DECOM
4420070-0.92L-1	0.1		UA	CLOSED	CLOSED	DECOM
4420070-1.11L-1	0.1		UA	CLOSED	CLOSED	DECOM
4420070-1.35L-1	0.4		UA	CLOSED	CLOSED	DECOM
4420080-1.08R-1	0.0		UA	CLOSED	CLOSED	DECOM
4430100-0.50R-1	0.0		UA	CLOSED	CLOSED	DECOM
4430205-0.09L-1	0.4		UA	CLOSED	CLOSED	DECOM
4440000-0.33R-1	0.1		UA	OPEN	DECOM	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4440000-0.33R-2	0.3		UA	OPEN	DECOM	DECOM
4440000-0.92R-1	0.2		UA	OPEN	DECOM	DECOM
4440000-1.55R-1	0.2		UA	OPEN	DECOM	DECOM
4440000-1.89R-1	0.2		UA	CLOSED	CLOSED	DECOM
4440000-2.21R-1	0.1		UA	OPEN	DECOM	DECOM
4440000-2.53R-1	0.1		UA	CLOSED	CLOSED	DECOM
4440000-2.60R-1	0.4		UA	OPEN	DECOM	DECOM
4440000-2.60R-2	0.2		UA	CLOSED	CLOSED	DECOM
4440000-2.60R-3	0.1		UA	CLOSED	CLOSED	DECOM
4440000-2.60R-3	0.0		UA	CLOSED	CLOSED	DECOM
4440000-2.82L-1	0.2		UA	OPEN	DECOM	DECOM
4440000-3.19R-1	0.1		UA	OPEN	DECOM	DECOM
4440000-3.40R-1	0.1		UA	OPEN	DECOM	DECOM
4440000-3.47R-1	0.1		UA	CLOSED	CLOSED	DECOM
4440000-6.04L-1	0.1		UA	CLOSED	CLOSED	ML2
4440362-0.06L-1	0.0		UA	CLOSED	CLOSED	DECOM
5005220-0.67L-1	0.3		UA	CLOSED	CLOSED	DECOM
5005220-1.07L-1	0.2		UA	OPEN	DECOM	DECOM
5005220-1.30-1	0.4		UA	OPEN	DECOM	DECOM
5005220-1.30-2	0.2		UA	OPEN	DECOM	DECOM
C-1065-4.07R-1	0.3		UA	OPEN	DECOM	DECOM
C-1090-0.88L-1	0.2		UA	CLOSED	CLOSED	DECOM
4410380	0.4			ML2	ML1	DECOM
NEW CONSTRUCTION / 4435080-0.34L-1	0.2	P4435085	UA	ML2	ML3	ML3
4350116-0.36R-1	0.7		UA	CLOSED	CLOSED	DECOM
4350116-0.36L-1	0.3		UA	CLOSED	CLOSED	DECOM
4350116-0.36L-2	0.1		UA	CLOSED	CLOSED	DECOM
4350114-0.42L-1	0.5		UA	CLOSED	CLOSED	DECOM
NEW CONSTRUCTION / 4345230-1.20L-1	0.4	P4345235	UA	ML2	ML1	ML1
4345230-0.47L-1	0.3		UA	OPEN	DECOM	DECOM
4345230-0.58L-2	0.1		UA	CLOSED	CLOSED	DECOM
4345230-0.58L-1	0.1		UA	CLOSED	CLOSED	DECOM
4345230-0.58R-1	0.5		UA	CLOSED	CLOSED	DECOM
4345225-0.02L-1	0.4		UA	CLOSED	CLOSED	ML1
NEW CONSTRUCTION / 4345200-1.75R-1	0.5	P4345270	UA	ML2	ML2	ML2
4300360-1.25R-1	0.5		UA	OPEN	DECOM	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
4300360-1.68R-1	0.5		UA	CLOSED	CLOSED	DECOM
4300130-0.35L-1	0.4		UA	CLOSED	CLOSED	DECOM
4400130-0.50R-1	0.3		UA	CLOSED	CLOSED	DECOM
4400100-4.13R-1	0.7		UA	CLOSED	CLOSED	DECOM
4400100-4.13L-1	0.2		UA	CLOSED	CLOSED	DECOM
4400110-0.82R-1	0.4		UA	CLOSED	CLOSED	DECOM
4345200-1.75R-2	0.5		UA	OPEN	DECOM	DECOM
4415040-0.49L-1	0.1		UA	CLOSED	CLOSED	DECOM
NEW CONSTRUCTION / C-9114-10.13R-1	0.5	P4400029	UA	ML2	ML1	ML1
4430100-1.39R-1	0.2		UA	CLOSED	CLOSED	DECOM
4430000-2.29L-1	0.1		UA	CLOSED	CLOSED	DECOM
4435000-1.38R-1	0.2		UA	CLOSED	CLOSED	DECOM
4435000-1.38R-2	0.0		UA	CLOSED	CLOSED	DECOM
4400050-1.50R-4	0.3		UA	CLOSED	CLOSED	DECOM
4440000-2.41R-1	0.1		UA	OPEN	DECOM	DECOM
4440000-0.97R-1	0.1		UA	OPEN	DECOM	DECOM
4400000-6.75R-1	0.0		UA	CLOSED	CLOSED	DECOM
4350125-1.24L-1	0.2		UA	CLOSED	CLOSED	DECOM
NEW CONSTRUCTION / 4350130-1.10L-1	0.5	P4350133	UA	ML2	ML1	ML1
4350130-1.20R-1	0.1		UA	CLOSED	CLOSED	DECOM
NEW CONSTRUCTION / 4400000-3.36L-2	0.1	P4400155	UA	ML2	ML3	ML3
4350115-0.12L-1	0.1		UA	CLOSED	CLOSED	DECOM
NEW CONSTRUCTION / 4400110-0.90R-1	0.3	P4400113	UA	ML2	ML2	ML2
NEW CONSTRUCTION	1.2	P4400114	UA	ML2	ML2	ML2
5005220-0.93R-1	0.1		UA	OPEN	DECOM	DECOM
NEW CONSTRUCTION	0.7	P4415043		ML2	ML2	ML2
4410000-1.02R-1	0.2		UA	ML2	ML1	ML1
NEW CONSTRUCTION	0.4		UA	ML2	ML2	ML2
NEW CONSTRUCTION / 4415040-1.32R-1	0.5	P4415041	UA	ML2	ML2	ML2
4415030-0.34L-4	0.5		UA	OPEN	DECOM	DECOM
4415030-0.34L-1	0.6		UA	OPEN	DECOM	DECOM

Route Number	Segment Length	New Route Number	ML Current	ML During Harvest	ML During Prescribed Burning	ML Post Project
NEW CONSTRUCTION / NC-1145-0.91R1	0.3	P5005110	UA	ML2	ML2	ML2
NEW CONSTRUCTION / C-1145-0.91L1	0.5	P5005100	UA	ML2	ML2	ML2
NEW CONSTRUCTION / 4400040-1.67R-1	0.6	P4400042	UA	ML2	ML1	ML1
4415030-0.34L-5			UA	CLOSED	CLOSED	DECOM
4415030-0.34L-3	0.1		UA	CLOSED	CLOSED	DECOM
4415030-0.34L-1	1.3		UA	OPEN	DECOM	DECOM
4415030-0.34L2	0.4		UA	OPEN	DECOM	DECOM
NEW CONSTRUCTION	0.7	P4345280	UA	ML2	ML1	ML1
4415040-3.16L-1	0.5		UA	CLOSED	CLOSED	DECOM
4415040-3.16L-2	0.5		UA	CLOSED	CLOSED	DECOM
4415040-3.16L-3	0.1		UA	CLOSED	CLOSED	DECOM

Hazard and Danger Tree Removal

Trees within 200 feet of open NFS roads (including proposed new permanent road construction and NFS roads designated for administrative use only) and at developed recreation facilities (6 campgrounds, 7 trailheads) would be assessed to determine if they meet the “hazard” or “danger” tree criteria using appropriate established field guides (Filip et. al. 2014; Filip et al 2016). Trees identified as hazard or danger trees would be felled by FS personnel or contractors as part of standard hazard abatement procedures prior to construction or use of roads for project implementation (USDA Forest Service Manual (FSM) 7700, Chapter 30), likely starting the first year of project implementation and continuing for approximately 15 years. Debris from this activity may be left on site for habitat enhancement, used for aquatic habitat enhancement projects proposed in this project, or removed by the public for firewood as determined by FS personnel if consistent with current district firewood removal guidelines and proposed firewood removal proposed in this project.

Hazard trees are evaluated for failure potential using Filip et al. 2014. Failure potential is estimated by examining a tree, determining the factors and conditions that could contribute to failure or weakening, and estimating the likelihood that those factors and conditions will simultaneously occur before the next inspection period. Tree characteristics to be evaluated include:

1. Whether the tree is live or dead
2. Presence of dead, broken, or free-hanging branches
3. Presence or a recent weakening of co-dominant stems or dead, forked, or multiple tops
4. Presence of wounds, injuries, exposed or damaged roots, and associated decay or defect
5. Lean of a tree and factors that contributed to the lean

6. Whether a tree has recently been root-sprung (lateral-root anchorage has been compromised)
7. Whether trees that previously leaned have righted (corrected) their tops subsequently and now have acceptable lateral anchorage

Furthermore, Filip et a. also considers the “failure zone” defined as the area on the ground that could be reached by any portion of the tree that may fail. When determining the failure zone, the following conditions must be evaluated: ground slope, direction of lean, and height of the tree.

Danger trees are evaluated for failure potential using Filip et al. 2016. There are six steps the qualified person should take when dealing with potential danger trees:

1. Determine tree-species groups, defects, and failure potential.
2. Determine the type of activity.
3. Determine the tree’s potential-failure zone.
4. Determine if the tree poses a danger.
5. Document the danger-tree assessment.
6. Determine what action to take if the tree is a danger.

Once the road system has been prioritized, the survey is best done on the ground in a strip along both sides of the road. The width of each survey strip should be 1 ½ times the length of the tallest tree that could strike the road. Failure potential is defined as the likelihood that a tree or its parts will fail during a certain time period. For roadside and work site danger trees, there are three levels of failure potential: low, likely, and imminent.

Exposure to danger trees is prohibited by state safety laws. Not all activities expose people to the same risks. Some activities can induce tree failure, such as operating heavy machinery around an unstable tree. Some activities have an increased risk due to the length of exposure to a tree with defects. The type of activity is extremely important when determining if a tree is a danger to people or property. There are three categories of activities: traffic on roads, non-motorized activities that do not touch the tree, and motorized activities near the tree or activities that may cause the tree to be contacted

The potential-failure zone is the area on the ground that could be reached by any part of a failed tree. When a tree fails, the tree or its parts may slide or roll. When a tree fails, it may strike other trees or debris on the ground and propel material a considerable distance. This is especially true for dead trees, tops, or branches.

Construction and Decommissioning Trails

Hand tools and small machinery such as a mini-excavator would be used to construct three new trails in the Chickadee area designed by FS staff and partners for specific use (mountain biking) or multi use (hiking, bicycling, and horseback riding) in specified locations. Work may occur in the spring through fall months likely within the first five years of project implementation and would be accomplished by agency partners. Concurrent with this work, up to two miles of user-built trails would be decommissioned by agency partners using the same equipment. within Areas of disturbed soil not used as a trail would be rehabilitated using mitigation measures described in Appendix B.

Wildlife Habitat Treatments

In addition to the thinning and prescribed fire treatments that would benefit wildlife habitat, Alternative 2 includes the following treatments.

Beaver Dam Analog Construction

Up to 30 beaver dam analogs (BDAs) would be constructed in 5 areas in the Little Bridge Creek, Newby Creek, and Poorman Creek drainages (Figure 23, Appendix D). BDAs would be installed by FS staff and partners within the first 10 years of project implementation; work may begin as soon as project implementation starts as funding became available. These structures would imitate the design and function of natural beaver dams by constricting the flow of water at these locations, impounding water and helping expand wetland habitat used by a variety of animals. Construction would involve hand-felling locally sourced brush and small trees, setting posts with a hydraulic post driver, and hand-placement of remaining materials at suitable sites. BDAs may create habitat that is naturally recolonized by beaver. If this does not occur, any subsequent beaver relocation to these sites would be conducted by FS and WA DFW staff using existing WA DFW protocols.

Raptor Nest Platforms

Up to five artificial nest platforms would be installed in the northeastern portion of the project area to provide additional nest sites for raptor. Work would occur after commercial thinning treatments in the area were completed, after which the district wildlife biologist would select sites. These sites would be installed by hand-climbing trees and building the platform with hand tools. Work would be completed by agency staff or partners.