Midnight Restoration Project

Preliminary Proposed Action

Photo by Allison Rossman

RESILIENT FORESTRY

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Introduction

This document provides a preliminary description of a Proposed Action for the Midnight Restoration Project. The development of a full Proposed Action is a complex process involving the assessment of many forest resources by an interdisciplinary team. This preliminary proposal is just one step toward a full proposal, focusing primarily on **landscape-level ecological objectives** while also including some finer-scale ecological and operational considerations. We expect minor changes as the NEPA process continues and field work is conducted to verify current conditions.

Moving from the landscape to the stands

The goal of the Preliminary Proposed Action is to describe a general plan and implementation tools that could be used to address the Needs of the project. At this stage, we apply the landscape prescription at the stand level. We aim to achieve landscape-level goals while incorporating finer-scale ecological variation, essential policy guidance, and basic operational constraints.

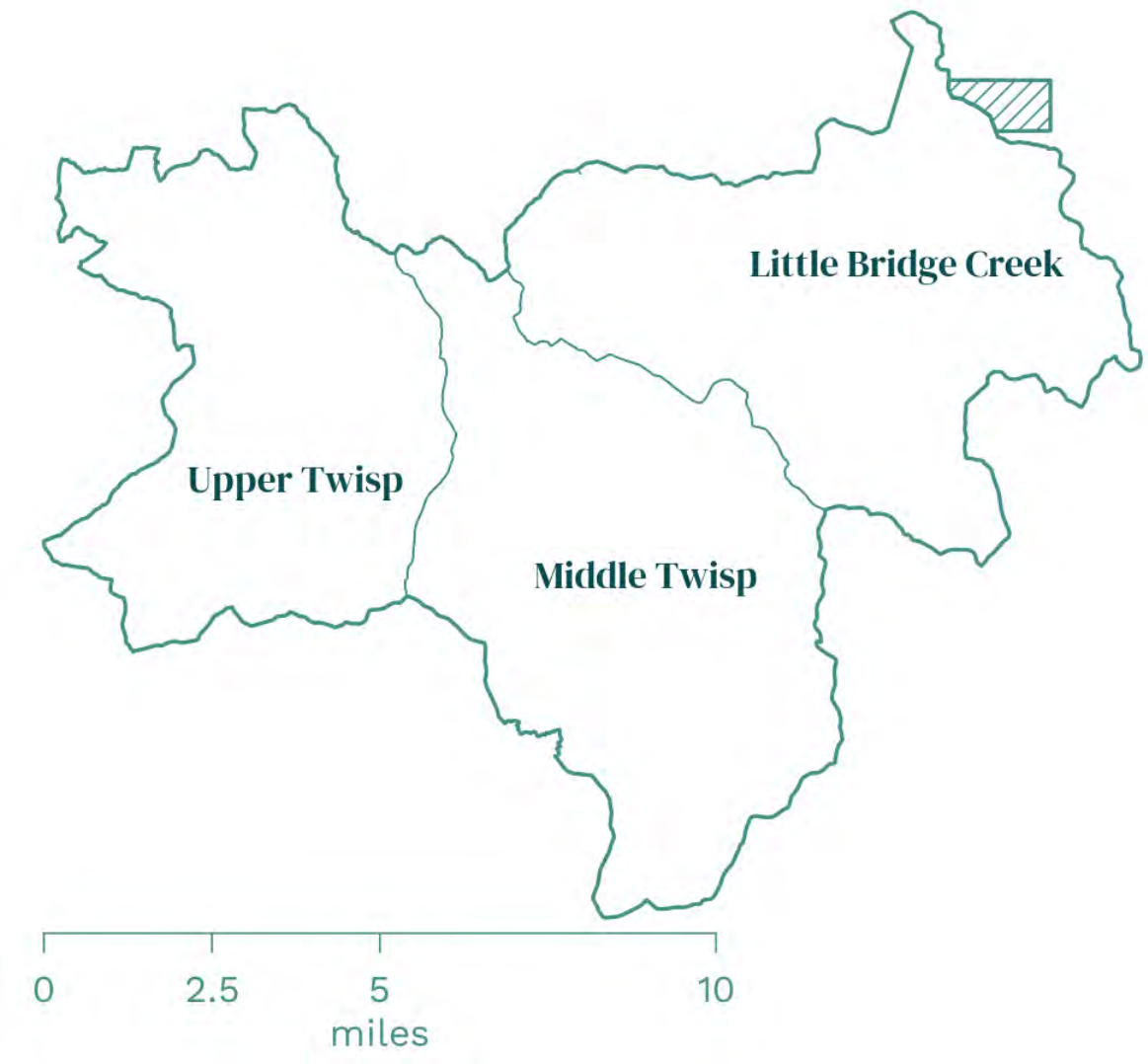
The landscape evaluation identified the overarching need to increase resiliency to future fire and drought. Where fire has been excluded for many decades, particularly in the valley bottoms along the Twisp River, stands are often dense and multi-storied. They are primed to burn at high severities and lose resistance to insects and disease as drought increases with climate change. Large, old ponderosa pines (and occasionally Douglas-fir) in some of these stands are evidence of a history of natural and cultural burning and need to be protected from crown fire.

At the same time, some of these dense, multi-story stands provide current northern spotted owl habitat, or are located in moist microsites or in riparian reserves. The fate of these important features must be balanced with goals of reducing risks associated with fire and drought by refining prescriptions to retain high-quality owl habitat, protect riparian vegetation and soils, and identify where dense, multi-layered forest is sustainable into the future.

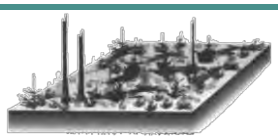
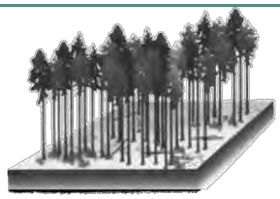
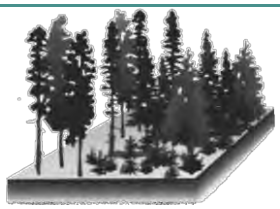
Outside of the valley bottoms, much of the Midnight Restoration Project area burned in the 2019 Crescent or 2021 Cedar Creek fires. Many stands were not in resilient conditions prior to the wildfires. Often, substantial mortality caused by the fires has left high fuel loadings, increasing the chance of a severe re-burn that would hinder post-fire recovery. Thus, it is a goal in these locations to reduce fuels and promote a resilient living forest. Where sufficient live trees survived the fire, target structure and spatial patterns are similar to unburned forest: protect and promote large trees, reduce ladder fuels, and vary canopy density and layers according to topography. Where mortality was high and the stand is regenerating, the objectives are reducing total fuels and, ultimately, planting in strategic locations.

As a bridge between the landscape evaluation and the ultimate Proposed Action, this document is concerned with both landscape-level and stand-level conditions, goals, and constraints. The overall outcome of the preliminary Proposed Action would be to improve fire and drought resilience; align forest structure and landscape-level spatial patterns with reference conditions; and protect existing high-quality owl habitat, sustainable multi-layered forest canopy patches, and riparian and microtopographic variation. Within stands, the preliminary Proposed Action would retain and promote most large trees and all old trees while restoring characteristic spatial patterns of tree clumps and canopy openings.

The text and maps in this document contain references to three constituent subwatersheds, shown here:



Stand development stages cheat sheet

Abbreviation	Meaning	
SI	Stand initiation	
SEOC	Stem Exclusion, Open Canopy	
SECC	Stem Exclusion, Closed Canopy	
YFMS	Young Forest, Multi-Story	
UR	Understory Reinitiation	
OFMS	Old Forest, Multi-Story	
OFSS	Old Forest, Single-Story	

Need for the proposal

The Midnight Restoration Project area is currently departed from conditions that would be resilient to disturbance and climate change. Landscape-level assessments show that current departures in forest structure, spatial patterns, and fuel loads favor larger, more severe disturbances relative to historical baselines and hinder adaptation to climate change. Restoration toward desired conditions would promote a resilient landscape, protect key resources, and increase human safety, while also providing an opportunity to involve the community and increase local economic well-being. Maintaining access to the forest through a safe and efficient transportation system is also a key component of increasing resilience.

The process and ecological basis by which desired conditions and appropriate treatments have been determined are described in the 2012 Okanogan-Wenatchee National Forest Restoration Strategy (USDA Forest Service 2012), the 2022 Midnight Landscape Evaluation and Prescription (Jeronimo 2022), and the references listed in Appendix A, and will be further elaborated in the specialist reports that accompany an eventual final Proposed Action. Based on these documents, the purpose of the Midnight Restoration Project is to ameliorate the following needs in the Project Area.

Need 1: Move current vegetation structure and composition toward desired reference conditions.

Landscape evaluations show that vegetation structure and composition in the Midnight Restoration Project area is departed from resilient reference conditions in the following ways:

- **Forest type and structure class:** There is currently far less old forest and more young, dense forest than is desired for a resilient landscape (Figure 1). Across forest types and sub-watersheds, late and old forests represent the lowest 20% of their desired ranges of variation while young, multi-story forests occupy 50-322% of their reference acreages. There is a need to reduce over-represented classes and transition them into under-represented classes, as well as to maintain the structure and vigor of stands within non-departed classes.
- **Spatial pattern of forest patches:** Large patches of dense, young forest have developed following wildfires in the past, increasing the potential extent of future disturbance and mortality. On the other hand, patches of moist, old forest are too small and fragmented to provide effective habitat. There is a need to restore the size and shape of the forest patches to establish a resilient landscape mosaic.
- **Fire regime:** Based on current vegetation conditions, 20% of both Upper and Middle Twisp sub-watersheds are primed to burn at higher severities than would have occurred historically. Higher fire severities can slow or preclude post-fire recovery. There is a need to re-establish frequent fire and adapt to climate change by decreasing fire return intervals and reducing future fire severity. This would increase resilience and protect resources such as old trees and critical habitat.
- **Climate change:** Areas most suitable for each forest type are shifting due to drought and disturbance associated with the changing climate. By 2055, over a third of dry forest in the Project area is expected to experience levels drought stress that are currently seen only in habitats that are too dry to support forest. Similarly, three-quarters of the moist and transitional forest is expected to experience levels of drought that are currently characteristic of dry forest. When environmental conditions change, a forest can experience low vigor, low resistance to disturbance, and increased mortality. There is a need to anticipate these forest type shifts and re-align vegetation with its environment to improve climate change resilience.

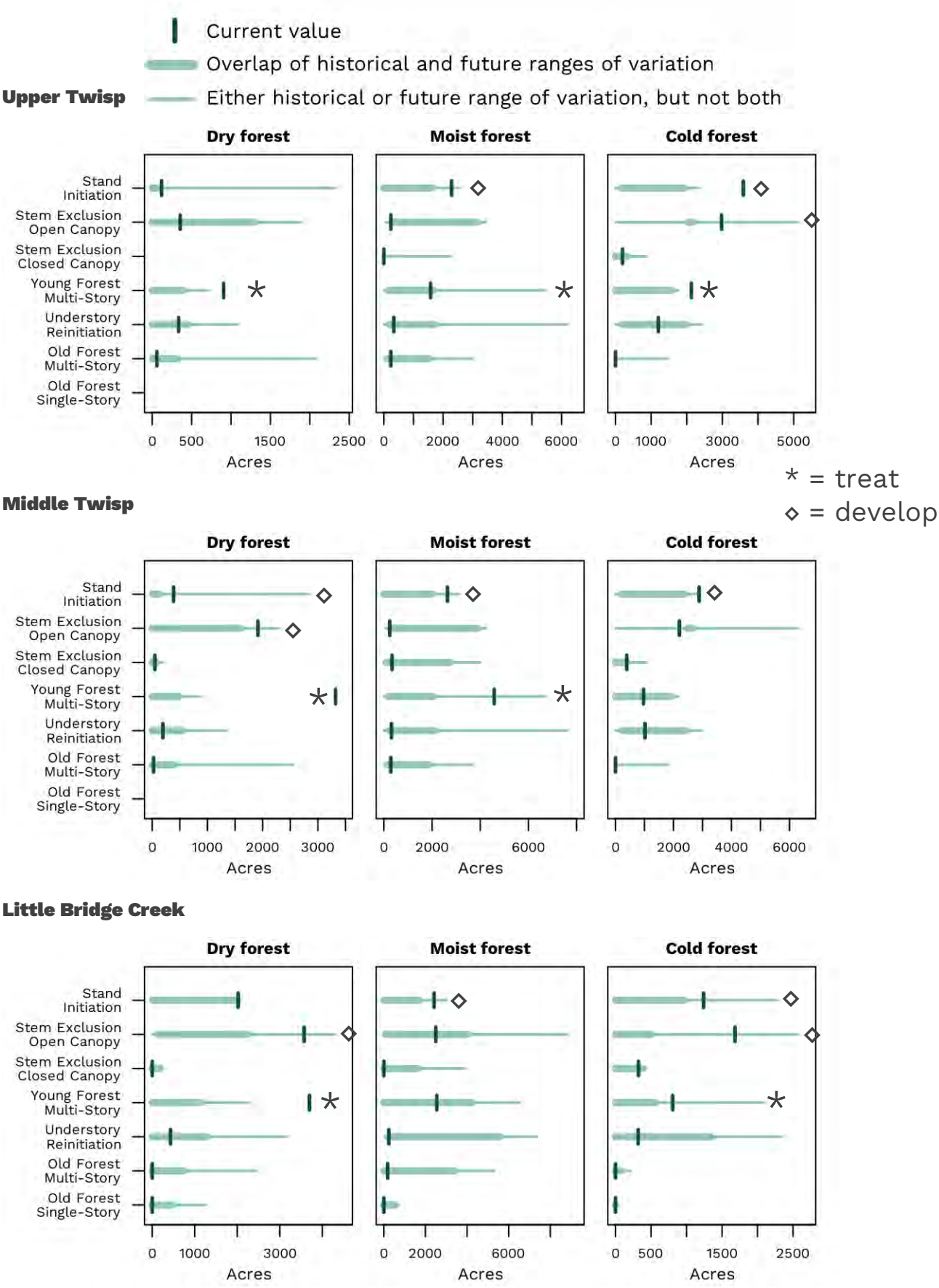


Figure 1 Comparison of current versus reference conditions

- **Post-fire restoration:** The 2018 Crescent Fire and 2021 Cedar Creek Fire burned many forest stands that were not in resilient conditions. In dense stands where the fire burned at low or moderate severities, there is a need to reduce fuel loads to prevent high-severity re-burn and protect the regenerating forest. On dry sties, there is a need to promote fire- and drought-tolerant species to increase resilience to climate change. Where the fire burned at high severity and stands are regenerating, there is a need to maintain conditions that facilitate seedling growth and survival through future disturbance, including maintaining fuel loadings that limit the risk of high-severity re-burn, yet support sufficient soil moisture for seedlings to grow.

In addition to those identified in the landscape evaluations, the following needs exist within the planning landscape to move vegetation structure and composition toward desired conditions:

- **Late-successional reserves (LSR):** Addressing the landscape-level needs described in the preceding bullets would require treatment in LSR. These treatments would maintain, enhance, and protect present and potential late-successional habitat as well as restore previously-managed stands to a seral stage leading toward late-successional habitat, consistent with the 1998 LSR Assessment (USDA Forest Service 1998) objectives.
- **Riparian reserves (RR):** In the forest portions of RR, there is more young and dense forest, higher fuel loads, and a higher proportion of conifers than that which supports a resilient landscape and riparian corridor function. There is a need to remove conifers to restore riparian forest overstory and understory composition and reduce fuel loads to mediate fire delivery to and behavior in riparian corridors. Treatments addressing these needs would protect aquatic systems, maintain and restore the species composition and structural diversity of plant communities in riparian areas, and maintain and restore habitat to support well-distributed populations of riparian-dependent species, consistent with the Aquatic Conservation Strategy objectives in the Northwest Forest Plan (USDA 1994, 2001).
- **Understory vegetation:** The overabundance of dense, young overstory trees has contributed to understory plant communities that are not adapted to fire and drought. There is a need to restore understory vegetation diversity and shift understory species composition toward communities that support fire and drought resilience. Further, increased conifer encroachment in unique habitats such as meadows and aspen stands has reduced the availability of nutrients, water, and sunlight to these habitats and species.

Need 2: Protect and maintain wildlife habitat and complex forest in strategic places.

High-quality nesting and roosting habitat for the northern spotted owl is sparse within the Project area, occurring almost exclusively in forests that are highly departed from sustainable conditions (Figure 2, top). To support northern spotted owl, there is a need to retain the existing complex forest structure in these small but unsustainable areas and to protect them from fire by reducing fuels and creating resilient structure in the surrounding forest. Since almost all current high-quality habitat exists in locations that are not environmentally suitable for dense forest over the long term, there is also a need to maintain and create dense, complex forests as replacement habitat in locations that will continue to support it as the climate changes.

Habitat of the white-headed woodpecker – open pine forests with solitary large trees – is at risk of infilling. This habitat requires maintenance to prevent it from becoming too dense and burning at high severity.

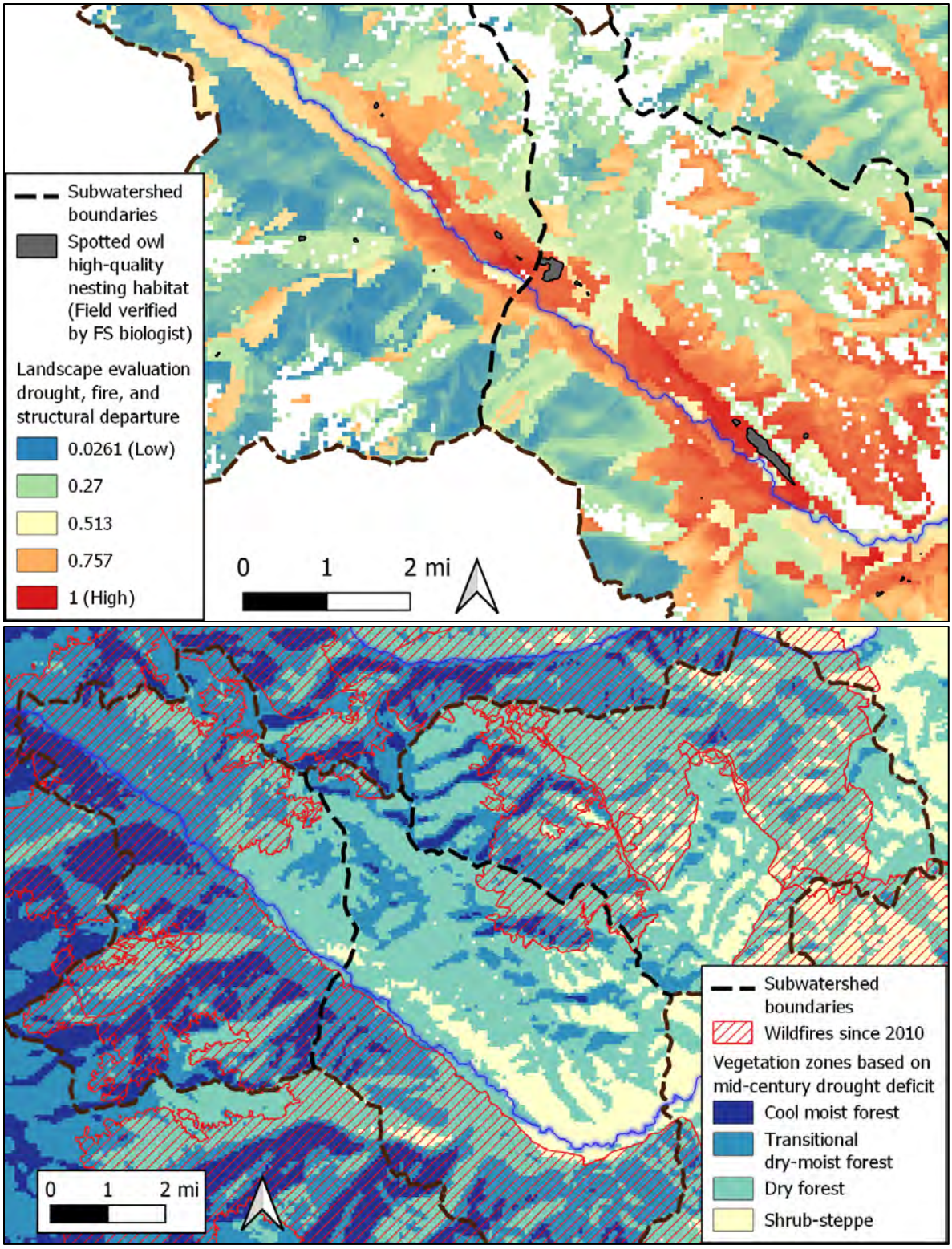


Figure 2 Existing northern spotted owl habitat with landscape departure (top) and future (ca. 2055) moisture deficit with wildfire perimeter overlay (bottom). Existing owl habitat needs protection from severe fire, and new habitat needs to be created in sustainable locations. Future moisture deficit shows where complex forest, which is rare amidst recent wildfires, is sustainable into the future and should be protected.

Finally, dense, complex forest with large trees provides abundant ecosystem services and habitat for a range of organisms, but is uncommon in the Project area following recent wildfires. Dense forest also has a high risk of mortality from future drought and fire when it resides on too dry a site. There is a need to protect sustainable sites with low future moisture deficit that currently have or have the potential to support large complex forest into the long term (Figure 2, bottom). These sites include patches of live forest in large burned areas and highly sustainable but recently burned forest.

Need 3: Provide an affordable, safe, and efficient transportation system and reduce sedimentation from roads on National Forest System lands.

Road modifications are needed to improve watershed health and provide a transportation system that is affordable, safe, and efficient for administration, public use, and protection of National Forest System (NFS) lands while also providing access for forest management. Seventeen miles of NFS roads and 26 miles of unauthorized roads (i.e., roads not in the NFS road inventory) are unneeded now and/or in the long term, and contribute sediment to waterways. Some NFS roads that access the Gilbert and South Creek Trailheads are undersized for the current volume and type of vehicle traffic and need to be brought up to current safety standards. Another four miles of existing but unauthorized roads have been used to access Wolf Creek Ditch facilities for several decades, provide the only feasible access to private lands, or provide emergency egress from the Pine Forest community. These unauthorized roads need to be added to the NFS road inventory and permitted to comply with agency direction. Finally, along open NFS roads in areas that burned in 2019 and 2021, there is a need to address live and dead trees that are increasingly unstable and threaten the safe use of the roads. These “danger trees” need to be assessed and removed.

Need 4: Reduce fire hazards along ingress/egress routes and improve firefighting effectiveness within and adjacent to WUI.

Current fuel loadings and stand structures along portions of some main access routes and key unroaded ridges in and adjacent to the WUI support fire behavior with flame lengths that limit direct suppression tactics. Along roads, these conditions increase hazards for Forest visitors trying to leave the area and suppression resources trying to access the area during wildfires. On ridgetops, these current conditions increase the likelihood that wildfires will cross into adjacent drainages towards developed areas and limit suppression opportunities without substantial preparation.

In these locations, there is a need to reduce and/or maintain dead and downed materials at low levels to diminish fireline intensity and to minimize the hazards of ingress and egress during fires, and to modify vegetation and fuels along ridges and roads to reduce and/or maintain a low risk of crown fire initiation. There is also a need to create and/or maintain effective suppression anchor points that can be used to limit fire spread during wildfires. Meeting these needs complements ecological goals of protecting and sustaining current and future northern spotted owl habitat and rare ecological features such as Forest Plan Old Growth by increasing the likelihood of containing wildfires when expected fire behavior is outside of the desired ecological range of variability.

Preliminary Proposed Action

The activities proposed in this section serve to meet the needs of the project. Though basic operational constraints and policy guidance have been incorporated, this proposal is preliminary and has not been fully vetted for compliance with all resources. Therefore, additional minor changes are expected as the NEPA process continues and fieldwork is conducted to verify current conditions.

Vegetation and fuels treatments

Eight vegetation treatment types are proposed to serve project needs 1, 2, and 4 (Table 1). Tools include silvicultural and/or fuels activities. All maps can be found in Appendix B.

No stands in Wilderness have had treatments proposed. The only activity proposed in Riparian Reserves is in the treatment type "Riparian treatment." Details regarding proposed treatments in Inventoried Roadless Areas, Late-Successional Reserves (LSR), and other areas of interest can be found in Table 2.

While we have considered operational feasibility at a coarse scale, we have erred on the side of including stands in the proposal that, with field verification and additional GIS assessment, may eventually prove infeasible to operate on. For commercial work, we have considered logging feasibility layers from Washington DNR's landscape evaluations and ruled out slopes steeper than 80% grade, areas greater than one mile from a road, and areas without road access where temporary roads would not be possible due to highly erosive soils or riparian crossings.

Selected design criteria

Two design criteria of particular interest have been written at this time. We anticipate more criteria, many standard to these types of projects, to be added during the NEPA process.

1. In all stands, no live or dead trees older than 150 years, as determined using external morphological characteristics, would be cut, except for hazard trees and as necessary for operations. Such cutting would be minimized and designated by U.S. Forest Service silviculture staff.
2. In Late-Successional Reserve, no live or dead trees 21.1-25" in diameter at breast height would be cut, except: 1) where a stand exceeds the minimum density objectives for trees over 20" in diameter at breast height as described in the Okanogan-Wenatchee National Forest Restoration Strategy (2012; 17 trees per acre in SEOC and SECC, 11 trees per acre in YFMS and UR); and 2) where needed to meet ecologically-based structural, composition, or spatial pattern objectives, and for hazard trees and as necessary for operations. No live or dead trees over 25" would be cut, except for hazard trees and as necessary for operations. Such cutting of trees >21" diameter would be minimized and designated by U.S. Forest Service silviculture staff, with brief documentation provided to the public.

The second design criterion would be relevant to stands in LSR that contain trees >21" in diameter at breast height. According to stand exam data collected in 2019 for stands in LSR along the Twisp River and upper Little Bridge Creek, 74% of stands contain trees >21", and 46% contain more than 15 trees per acre of this size (equating to ≥36 ft^2/ac) – a rough threshold for where the exceptions to the criterion may be utilized. Twenty-one percent of stands contain more than 20 trees per acre of this size (equating to ≥48 ft^2/ac).

Table 1 The eight vegetation treatment types proposed in the Midnight Restoration Project area to meet project needs. Tools for each treatment include silvicultural and/or fuels activities. Treatment objectives and general approaches are presented in this document, but prescriptions have not been developed for this preliminary proposal.

Treatment type	Project needs addressed	Tools	Treatment objectives	Preliminary proposed area
YFMS thin	1, 2	• Commercial thin • Pile burn • Broadcast burn	Shift YFMS stand structure to UR or SEOC in order to increase resilience to future fire and drought, protect and enhance large trees, and move the subwatersheds toward reference conditions and spatial patterns as identified in the landscape prescription. Use several stand characteristics to guide the prescription for each stand.	147 stands 9,216 acres
SEOC maintain	1, 2	• Commercial thin • Stand improvement thin • Pile burn • Broadcast burn	Maintain open-canopy, patchy conditions and foster large trees to facilitate development toward OFSS. Leverage burned stands to finish the restoration work that wildfire started. Use several stand characteristics to guide the prescription for each stand.	60 stands 3,964 acres
SI growth	1	• Stand improvement thin • Pile burn • Broadcast burn	Facilitate growth of regenerating stands established after high-severity wildfire. Prioritize sties with lower future moisture deficit and far from seed sources.	33 stands 2,371 acres
Closed canopy maintain	1	• Stand improvement thin • Pile burn • Broadcast burn	In closed-canopy stands, maintain tree vigor to sustain growth and resistance to insects and disease.	100 stands 5,486 acres
Re-establish fire	1	• Broadcast burn	Re-introduce fire across the landscape; propose for widespread use but anticipate limited implementation.	416 stands 24,154 acres
Large complex no treatment	2	• No treatments	Retain and protect multi-layered forest in the most sustainable locations. In the Upper Twisp, provide for future northern spotted owl habitat.	21 stands 847 acres
Riparian treatment	1, 2	• Commercial thin • Stand improvement thin • Pile burn	Build resilience to disturbance and drought, restore riparian forest composition.	181 stands 572 acres
Fuel break	4	• Commercial thin • Stand improvement thin • Pile burn • Broadcast burn	Reduce fireline intensity and risk of crown fire initiation along ingress/egress routes and at fire suppression anchor points, balancing effects to other forest resources by using prescription categories.	171 breaks 1,814 acres

YFMS thin: Increase resilience of young, dense forest

Treatment approach

Silvicultural and fuels treatments would be used to shift and then maintain structure class, spatial pattern, and species composition. Thinning would occur across the diameter distribution, with a focus on removing understory and midstory trees to reduce fuel continuity along with removing some overstory trees to reduce density, achieve spatial pattern goals, and shift composition toward drought- and fire-tolerant species. A clumpy spatial pattern would be prescribed, using trees ≥150 years old and trees >25" in diameter as guides when present. Commercial harvesting would be used where removed trees are merchantable, often coupled with a non-commercial mechanical fuels treatment and/or a stand improvement thin (a.k.a. non-commercial thin, pre-commercial thin). If removed trees are non-merchantable, a non-commercial mechanical fuels treatment and/or stand improvement thin would be proposed.

Many stands have been burned in wildfires. Those that have been substantially burned (>50% basal area mortality; "Substantially burned" stand characteristic in Table 2) need verification that they are indeed YFMS structure (which is based exclusively on live trees). If they are, dead trees would be prioritized to be removed first, and the work would likely occur as an expense under a service contract. Stands that are lightly burned should remain commercially viable if the trees are large enough; dead trees would not be prioritized for removal but would be removed as necessary to access live trees and to achieve fuel objectives.

Except where not operationally possible, silvicultural treatments would be followed up with prescribed fire to reduce activity fuels and restore low-intensity fire to the landscape. Broadcast burning would be preferred and prescribed where possible. Elsewhere, fuels would be piled and burned, allowing piles to creep out and consume nearby fuels to a limited degree where possible. Pile burning may also be followed by broadcast burning.

To maintain the trajectory toward desired conditions (e.g., resilient stand structures, spatial patterns, and fire regimes) over time, varying combinations of the treatments described above may be employed one or more times.

Stands for this treatment were selected primarily based on the landscape-level ecological objectives identified in the Landscape Evaluation. We used the identified treatment priority areas, combined with patch size goals (i.e., consolidate patches of old forest, break up large, dense patches) and protection of sustainable locations of multi-layered forest, to select the number of acres of YFMS that are structurally departed in each subwatershed. Operational and policy considerations of Wilderness, Inventoried Roadless, and logging system feasibility then guided which stands were possible and most reasonable for treatment. A map of these considerations can be found in Appendix A.

Preliminary silvicultural parameters

Silvicultural prescriptions have not been developed for this preliminary proposed action. Generally, the prescriptions would likely be for a residual stand density of 20-45% of max SDI and residual basal areas likely ranging from 35-200 ft^2/ac. The stand-level prescriptions would be dependent on characteristics described in Table 2. These characteristics reflect natural vegetative and environmental variation, forest resources, and policy direction. The stands for which each characteristic applies are identified, but should be verified with field reconnaissance during the NEPA process. See Appendix A for a map and table showing the characteristics that apply to each stand.

Table 2 Characteristics that affect the prescriptions of stands in the YFMS thin and SEOC maintain treatments. These characteristics reflect natural vegetative and environmental variation, forest resources, and policy direction. The stands to which each characteristic applies are identified, but should be verified with field reconnaissance during the NEPA process. See Appendix A for a map and table showing the characteristics that apply to each stand.

Stand characteristic	Description	Effect on prescription	# stands, acres applicable
Forest type	Uses potential and existing natural vegetation to guide post-treatment structure. The first word is derived from the potential vegetation group of a stand, which describes the climatic adaptation of the climax plant community (i.e., dry, moist, or cold). The second word describes the current dominant tree cover (i.e., PIPO, PSME, ABLA2/PIEN), which may or may not align with the climax plant community. Both components would be incorporated into prescriptions.	Higher residual density in moist and cold forest types (30-45% of max SDI) than in dry types (25-35% of max SDI). Stands with ponderosa pine (PIPO) cover would be treated to move into SEOC (patchy open canopy), eventually becoming OFSS. Stands dominated by Douglas-fir (PSME) or subalpine fir/Engelmann spruce (ABLA2/PIEN) would move into UR (moderate to closed canopy over a layer of small trees), eventually becoming either OFSS or OFMS.	All stands See Table 3 for stands and acreages of each forest type
Old or over 25” trees	Use old trees (≥150 years old) and trees >25” in diameter to guide spatial patterning and post-treatment structure. The desired pattern is clumps openings, and a few isolated trees, in accordance with reconstructions of historical spatial patterns	Trees ≥150 years old and >25” in diameter would provide the basis for spatial patterning within the stand. Residual basal area would be higher in stands with trees >25” in diameter. If few to no legacy trees are present, ICO (individuals, clumps, and openings) would be used to lay out the desired spatial pattern.	Photo-interpreted estimate: YFMS thin 38 stands 2,341 acres SEOC maintain 1 stand 34 acres
Substantially burned	In stands with >50% mean basal area mortality following the Crescent and Cedar Creek fires, this characteristic recognizes the higher proportion of dead trees and need for field verification of green tree structure. Immediate and delayed post-fire mortality have resulted in high numbers of dead trees and the possibility that the YFMS or SEOC structure currently identified is no longer accurate, particularly in the Crescent fire.	Field-verify green tree structure and commercial viability of the stand. When thinning, generally remove dead trees first (still following all guidance regarding retaining large trees and snags, spatial patterns, and target densities; the approach is not to remove all dead trees), then remove live trees as necessary. Masticate before prescribed burning if shrub cover is high.	Mean % basal area mortality based on 1-year RdNBR YFMS thin 10 stands 551 acres SEOC maintain 25 stands 1,799 acres

Stand characteristic	Description	Effect on prescription	# stands, acres applicable
Spotted owl	Retains and protects existing high-quality northern spotted owl nesting and roosting habitat, which was identified using lidar analysis and fieldwork by former USFS wildlife biologist John Rohrer for the Draft EA of the Twisp Restoration Project. Habitat definition was based on Recovery Act 32 of the USFWS's 2011 Revised Recovery Plan. No owls were detected during surveys in 2019 and 2020. The last owl detected in the Project area was in 2010 and, before that, 1995. Nearly all of the high-quality nesting areas are in forests that are highly departed from sustainable conditions. These environments have a high future moisture deficit, high wildfire risk, and structural departures from a sustainable landscape as analyzed in the landscape evaluation. Our approach is to retain the complex forest structure in these small but unsustainable areas and protect them by reducing fuels and creating resilient structure in the surrounding forest.	No treatment in the high-quality nesting habitat plus a small buffer (width to be determined during NEPA analysis by wildlife biologist). Outside of nesting area, treat according to landscape strategies, including reducing fuels to protect the existing habitat.	YFMS thin 7 stands 806 acres (stands encompass approximately 100 acres of nesting habitat) SEOC maintain 0 stand 0 acres
Late-successional reserve (LSR)	The landscape evaluation showed that treatments in LSR are necessary to move subwatersheds toward reference conditions and reach landscape-level goals, including commercial harvest to remove sufficient material to shift stand structures. Treatments would maintain, enhance, and protect present and potential late-successional habitat as well as restore previously-managed stands to a seral stage leading toward late-successional habitat, consistent with the 1998 LSR Assessment (USDA Forest Service 1998) objectives.	Stands in LSR would generally have higher residual basal area and canopy cover than Matrix.	YFMS thin 89 stands 5,901 acres SEOC maintain 17 stands 1,589 acres

Stand characteristic	Description	Effect on prescription	# stands, acres applicable
Inventoried Roadless Area	Stands in or partially in Inventoried Roadless Areas are not immune to ecological needs for treatment, and some stands were identified as a high priority in the landscape evaluation. With additional field verification, it would be possible to mechanically treat in stands in designated Inventoried Roadless Areas where roads already exists, without constructing or reconstructing roads or violating other components of the Roadless Rule.	Field-verify the need for treatment and current road conditions. Treat according to landscape resilience needs, using mechanical and fuels treatments. Fully decommission and re-contour roads after use, except for the following routes: 4410520, un-number 0.06 mile spur of 4410520, 4410530, un-number 0.15 mile spur of 4410530, 5005000, and 5005220. Do not add or reconstruct roads, including temporary roads.	YFMS thin 8 stands 641 acres (356 acres in IRA) SEOC maintain 8 stands 1,289 acres (860 acres in IRA)
Integrated fuel break	Proposed YFMS and SEOC stands adjacent to proposed fuel breaks would have their treatments integrated with the fuel break to maintain an natural-looking transition between them.	Feather treatments between the fuel break and treated stand.	YFMS thin 67 stands 4,888 acres SEOC maintain 14 stands 425 acres

Table 3 Forest type distributions for YFMS thin and SEOC maintain treatment types.

	YFMS thin		SEOC maintain	
Forest Type	# stands	Acres	# stands	Acres
Dry PIPO	80	5,143	34	2,994
Dry PSME	6	360	13	565
Dry ABLA2/PIEN	2	46		
Moist PIPO	19	1,367	5	183
Moist PSME	26	1,621	6	192
Moist ABLA2/PIEN	12	638		
Cold PSME	1	26	1	16
Cold ABLA2/PIEN	1	17	1	14

SEOC maintain: Maintain trajectory toward OFSS

Treatment approach

The landscape evaluation found a deficit of the OFSS structure class, which can develop from the SEOC structure class. It is important that current SEOC stands maintain their trajectory toward late-successional, open-canopy conditions and do not have vegetation fill in, which would increase fire and drought risks and change the structural trajectory.

Live and/or dead trees would be thinned to maintain or create patchy open-canopy conditions favoring fire- and drought-tolerant species. Thinning would be accomplished using equipment where treatments are commercially viable. Hand thinning would be used where cut trees are generally <10” diameter. In stands that were lightly burned by wildfire, this treatment would continue the restoration work that wildfire started, ameliorating high dead fuel loads to reduce the risk of severe reburn.

Many stands have been burned in wildfires. Those that have been substantially burned (>50% basal area mortality; “Substantially burned” characteristic in Table 2) need verification that they are indeed SEOC structure (which is based exclusively on live trees). If they are, dead trees would be prioritized to be removed first, and the work would likely occur as an expense under a service contract. Stands that are lightly burned should remain commercially viable if the trees are large enough; dead trees would not be prioritized for removal but would be removed as necessary to access live trees and to achieve residual fuel targets.

Except where not operationally possible, silvicultural treatments would be followed up with prescribed fire to reduce activity fuels and restore low-intensity fire to the landscape. Broadcast burning would be preferred and prescribed where possible. Elsewhere, fuels would be piled and burned, allowing piles to creep out and consume nearby fuels to a limited degree where possible. Pile burning may also be followed by broadcast burning.

To maintain the trajectory toward desired conditions (e.g., resilient stand structures, spatial patterns, and fire regimes) over time, varying combinations of the treatments described above may be employed one or more times.

Preliminary silvicultural parameters

Silvicultural prescriptions have not been developed for this preliminary proposed action. Generally, the prescriptions would likely be for residual stand density 20-35% of max SDI, with residual basal areas likely ranging from 30-150 ft^2/ac. Like the YFMS thin treatment, stand-level prescriptions would be dependent on characteristics described in Table 2. These characteristics reflect natural vegetative and environmental variation, forest resources, and policy direction. The stands for which each characteristic applies are identified, but should be verified with field reconnaissance during the NEPA process. See Appendix A for a map and table showing the characteristics that apply to each stand.

SI growth: Facilitate forest regrowth in stands regenerating after wildfire

Where previously high-density forests have burned at high severity, post-fire fuel deposition will result in high potential for severe reburn within about 10-20 years. Reducing these fuels would reduce the reburn potential and facilitate seedling survival.

Treatment would be to thin small and medium dead trees (likely non-commercial, but commercial where possible) and treat fuels with pile and/or broadcast burning. Retain large snags. This preliminary proposed action does not deal with planting. However, it is highly recommended to include planting in these treatment units as a component of the upcoming district-wide planning effort to address reforestation needs across the Crescent, Cedar Creek, and Cub Creek 2 fire areas.

Locations are prioritized where severe burn areas are too far away from a seed source to naturally regenerate and also have a high likelihood of supporting forest into the future (i.e., with a low future drought stress). We expect these areas to have higher seedling survival than locations with high future drought stress.

Closed canopy maintain: Maintain tree health and growth in closed stands

These treatments provide for long-term, non-commercial maintenance of the health of closed canopy stands by sustaining the growth of individual trees and their resistance to insects and disease. Stands selected for this treatment are SECC and YFMS stands that are not proposed for other treatments and have a density of >55% of the SDI maximum (to be verified in the field). Along with Matrix, it is appropriate to conduct this treatment in LSR, IRA, and burned areas (Table 2).

Implementation tools include stand improvement thinning of trees <10” diameter couple, where feasible, with broadcast burning and/or pile burning. The SDI would be reduce to 40-50% of SDI maximum while maintaining at least 40% canopy cover. These stands would then continue to function as closed-canopy forest, with the expectation that many trees will respond to treatment by expanding their crowns and substantially increasing the canopy cover from immediate post-treatment levels within 5 years.

Re-establish fire: Provision the reintroduction of fire to the landscape

In stands not proposed for other treatments and which are moderately or highly departed from their characteristic fire regime, restore surface fuel conditions in line with the fire regime. Broadcast burning is the preferred tool. Hand cutting and piling material may be used instead or in preparation for broadcast burning.

In conjunction with rebalancing structure classes, there is a need to reintroduce fire to portions of the landscape that are departed from their characteristic fire regimes. Based on Landfire fire regime condition class data, which maps the level of departure from historical

fire regimes, the vast majority of stands in the Project area are moderately to highly departed from their characteristic fire regime and would benefit from managed fire.

We expect many stands to be infeasible to burn based on their vegetative and/or environmental conditions, but we defer to the fuels specialist to determine site-specific feasibility. The objective of analyzing for this treatment is to give implementers the latitude to use fire where and when it is needed ecologically.

Along with Matrix, it is appropriate to conduct this treatment in LSR, IRA, and burned areas. We have not selected stands for this treatment that contain northern spotted owl habitat.

Large complex no treatment: Retain multi-layered forest in sustainable sites

Multi-story forests with large trees perform a variety of ecosystem services, including providing habitat for a range of organisms, and are an important component of the Midnight Restoration Project landscape. Most forests in the Project area are becoming drier and more fire-prone into the future, and will be most suitably occupied by lower density, open-canopy forests. However, a few sites are likely to continue functioning as sustainable locations for denser, multi-story forests.

In the Little Bridge Creek subwatershed, these sites are relatively moist places that did not burn or burned only lightly during the 2021 Cedar Creek fire. These are surrounded by burned forest. In the Upper Twisp subwatershed, these are locations that have the least (lowest 10%) current and future fire- and climate-induced drought stress and insect mortality.

In these areas we recommend engaging in no treatment and retaining multiple canopy layers, while treating adjacent stands to provide some protection from wildfire.

Riparian treatment

Proposed treatments in Riparian Reserves are identical to those proposed in the portion of the Twisp Restoration Project Draft EA that overlaps the Midnight Restoration Project. According to the Draft EA:

> 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.

Fuel break

Fuel breaks serve Need 4. They are linear strips typically at least 200 ft wide treated to facilitate future wildfire suppression efforts, by reducing fireline intensity and the risk of crown fire initiation. This typically requires reductions in overstory density, ladder fuels (understory and mid-story trees), and surface fuels, but the exact prescription may vary. The prescription could provide for higher live and/or dead tree retention in select locations, anticipating the need for light follow-up work in the event of a wildfire that required operationalization of the fuel break.

Recognizing that prescriptions can vary among fuel breaks, prescription categories based on location have been assigned to all fuel breaks (Table 4). These categories balance fuel break implementation with effects on other forest resources.

Fuel break locations are the same as those proposed in the the portion of the Twisp Restoration Project Draft EA that overlaps with the Midnight Restoration Project. However, some fuel breaks have already been implemented as a result of emergency management during the Crescent and Cedar Creek fires. Complete spatial data identifying these existing breaks were not available. As a result, acreages reported in Table 4 are not current.

A number of implementation tools are available for establishing fuel breaks, including commercial thinning, stand improvement thinning, pile burning, pile burning with creep, broadcast burning, and snag creation by topping. Existing fuel breaks would undergo small tree and ladder fuel removal to maintain fuel objectives over time.

Table 4 Prescription categories of fuel breaks based on landscape context and consideration of other forest resources. Categories would affect the prescription for each fuel break. Categories appear in this table in order of decreasing priority, that is the first category in the list that applies to a given stand is the only category that would affect that stand's prescription. Acreages do not account for breaks implemented during recent wildfire responses.

Prescription category	Location	Effect on prescription	Acres
WUI	Within the WUI perimeter as designated by the Okanogan County Community Wildfire Protection Plan Update (2013).	Lower residual density, low residual fuel, lower snag retention. No follow-up treatment needed in the event of a wildfire (maintained in operational status).	565
Large complex no treatment	Within Large complex no treatment stands.	No activity to avoid fragmenting patch of sustainable, complex forest.	30
Upper Twisp	In the Upper Twisp subwatershed.	Higher residual density, maximum temporary snag retention. Anticipate follow-up treatment if wildfire occurs.	260

Prescription category	Location	Effect on prescription	Acres
Integrated moist	Moist forest type and adjacent to a YFMS thin or SEOC maintain treatment stand (i.e., treatments with potential commercial thinning).	Moderate residual density, high temporary snag retention, feather with adjacent stand treatment.	244
Integrated dry	Dry forest type and adjacent to a YFMS thin or SEOC maintain treatment stand (i.e., treatments with potential commercial thinning).	Lower residual density, high temporary snag retention, feather with adjacent stand treatment.	595
Standalone	Not adjacent to a commercial treatment, and not of the other categories.	Moderate residual density, high temporary snag retention.	151

Transportation system and trail system changes

Changes to the transportation system and trail system serve project Need 3. The changes are the same as those proposed for the portion of the Twisp Restoration Project Draft EA that overlaps the Midnight Restoration Project. The changes include decommissioning National Forest System (NFS), unauthorized, and temporary roads; decommissioning roads to trail and stock driveway; closing NFS roads; constructing or improving temporary, unauthorized, and new NFS roads; constructing and decommissioning trails; and hazard and danger tree removal. Refer to the Twisp Restoration Project Draft EA (2020) for more information on these changes.