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Biological Assessment of the Sanpoil Vegetation Management Project

Three Rivers Ranger District

Colville National Forest

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Sanpoil Watershed Fisheries / Hydrology Report
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Sanpoil Watershed Project Botany Report
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Introduction

The Colville National Forest (CNF) proposes managing forest vegetation in the Sanpoil Project Area. The proposed action, would initiate forest management in the area which would include commercial treatment on about 6,156 acres. Pre-commercial thinning would occur on about 2,520 acres. There will be about 4,510 acres of ladder fuels reduction, and about 1,560 acres of dead tree felling. Additional surface treatments on about 6,570 of these and other areas would include underburning, mechanical and hand piling and pile burning, and lop-and-scatter of fuels. About 37.0 miles of roads would be reconstructed, and 6.1 miles decommissioned. About 1.0 miles of new temporary road would be constructed. Associated fish and wildlife habitat improvements would be completed.

This document analyzes effects to species listed as threatened or endangered under the US Endangered Species Act and US Forest Service sensitive species listed under the most recent sensitive species list (2015). There are no major wildlife issues associated with the project, and no wildlife concerns were identified during public scoping.

Project Area Description

The project is located on the Republic Ranger District of the Colville National Forest north of the Colville Indian Reservation, east of Highway 21, and south of Highway 20. The town of Republic lies roughly 1 mile north of the project area. The Sherman Pass Scenic Byway (Highway 20) runs east-west along the north end of the project area. The project area contains a mix of moist and dry stand types. Special features included Bald Snow, Thirteen Mile, and Cougar Mountain Inventoried Roadless Areas; the Sanpoil River, wildland urban interface, and key ingress/egress routes including McMann Creek and Hall Creek Roads. The legal description of the area is T35N R32E Sections 24, 25, 36; T35N R 33E Sections 1-36; T35N R34E Sections 1-10, 15-22, 27-35; T36N R33E Sections 17, 20, 21, 25-29, 32-36; T36N R34E Sections 27-36. Appendix B Figure 3 shows the 47,956 acre project area situated on the Republic Ranger District of the Colville National Forest. Elevations in the project area range from approximately 1,740 feet to approximately 7,308 feet. Slopes in the area range from 0 to 75 percent, and are mostly steeper than 40 percent.

Forest Plan Management Areas

The Colville Land and Resource Management Plan (LRMP), as amended, provides guidance and direction for management activities on all lands managed by the Colville National Forest. The LRMP establishes goals, objectives, and standards and guidelines on both a forest-wide as well as on a management area specific basis. The Sanpoil project area includes several management allocations, as displayed in **Error! Reference source not found.** states briefly the management area goals and objectives. In addition to following specific direction provided for each Management Allocation, this project would comply with forest wide management goals (LRMP 4-3, 4-2), as well as forest wide standards and guidelines (4-35 to 4-60).

Table 1: Management Allocations in the Sanpoil Project Area

1988 Forest Plan Management Allocations	Summary of Goals/Objective	Acres in Project Area	Percent of Project Area
MA-7 Wood/Forage	The emphasis is wood and forage. The goal is to manage to achieve optimum production of timber products while protecting basic resources.	14, 517	30%
MA-3B Recreation/Wildlife	The emphasis is recreation and wildlife. The goal is to provide semi-primitive, motorized and non-motorized recreation in roaded or non-roaded areas while meeting objectives of wildlife management.	11,483	24%
MA-8 Winter Range	The emphasis is winter range. The goal is to meet the habitat needs of deer and elk to sustain carrying capacity at 120 percent of the 1980 level, while managing timber and other resources consistent with fish and wildlife management objectives.	6,904	15%
MA-5 Scenic/Timber	The emphasis is scenic/timber. The goal is to provide a natural appearing foreground, middle, and background along major scenic travel routes while providing wood products.	4,668	10%
MA-1 Old Growth Dependent Species	The emphasis is old growth dependent species habitat. The goal is to provide essential habitat for wildlife species that require old growth forest components, and contribute to the maintenance of diversity of wildlife habitats and plant communities.	2,682	~5%
MA-3A Recreation	The emphasis is recreation. The goal is to provide roaded and unroaded recreation opportunities in a natural appearing setting	2,387	~5%
MA-11 Semi-Primitive, Non-Motorized Recreation	The emphasis is semi-primitive, non-motorized recreation. The goal is to manage these areas to protect the existing unroaded character and to provide opportunities for dispersed, non-motorized recreation	1,721	~4%
MA-4 Research Natural Area	The emphasis is research natural area. The goal is to provide opportunities for research in ecosystems influenced only by natural processes.	1,618	~3%
MA-6 Scenic/Winter Range	The emphasis is scenic and winter range. The goal is to provide a natural appearing foreground, middle, and background along major scenic travel routes while providing for winter range management.	1,011	~2%
Private Lands	A few blocks of private land exist in the project area they are mostly forested, and in a few cases contain structures	929	~2%
Total		47,956	100%

Current Vegetation

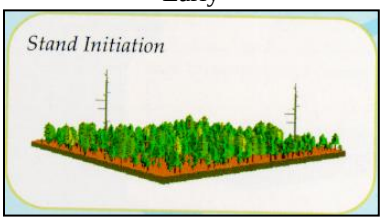
Most of the planning area outside of Inventoried Roadless Areas has been harvested in the last 20 years. Prior to 1995 many of the harvest treatments were even age cuts. After the mid-1990s harvests consisted primarily of commercial thinning or post-fire salvage. Many of these old even-aged cuts have grown into small pole stands of commercial size that are in need of thinning.

Many of the large ponderosa pine and Douglas-fir trees were left on site during more recent harvests. Unfortunately, a series of microbursts in a wind event in 2012 knocked many of these large trees over, especially in the previous Eagle Rock timber sale in the eastern part of the project area. Some of these windthrown trees were salvaged, however many were not and heavy windstorm-caused fuel accumulations still exist across the landscape.

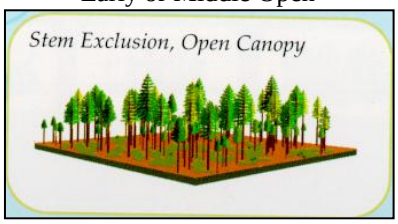
Stand Structural Stages

The Forest Plan identified discrete stages of timber stand development ranging from stand initiation to late and old structure. In March 2017, the CNF updated the structural stage categories based on tree diameter and canopy cover (Smoldon 2017).
Although the phrase "structural stage" implies a linear progression of stand development, forests do not necessarily follow a single pathway of vegetative change (forest succession) or attain a single stable condition (climax). Both natural and human disturbances have long-term influences on the composition of forests and on the successional pathways they follow. The following series of graphics depict points of structural stage (SS) development in a mixed conifer stand type.

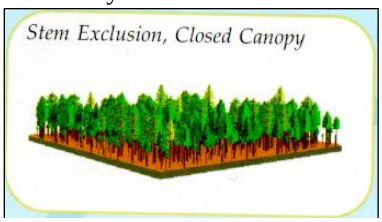
Early



Early or Middle Open

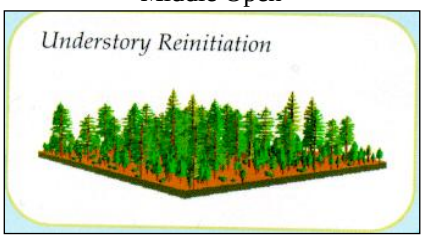


Early or Middle Closed

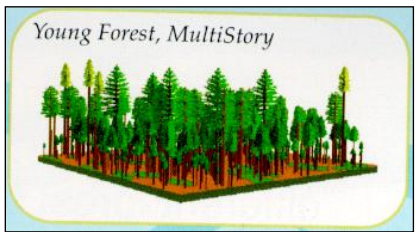


Early (SS1) - Trees less than 10 inches in diameter, or canopy cover < 10 percent.
Middle Open Canopy (SS2) - Trees 10 to < 20 inches in diameter, canopy cover 10 to < 40 percent.

Middle Open

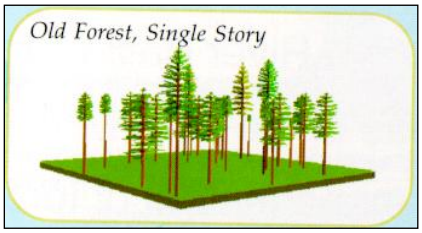


Middle Closed

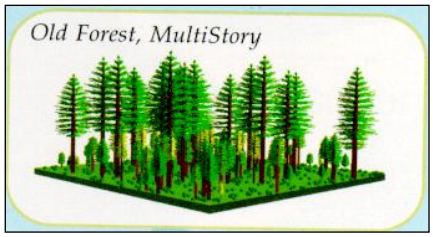


Middle Closed Canopy (SS3) - Trees 10 to < 20 inches in diameter, canopy cover 40+ percent.

Late Open



Late Closed



Late, Open Canopy (SS4). Typically, a single layer of large (20+ inch) trees is present in this late stage. The understory may be absent or may contain sparse or clumpy seedlings and saplings. These stands are often park-like in appearance. Canopy cover is < 40 percent.

Late, Closed Canopy (SS5). This late structural stage contains two or more cohorts of trees, and trees of all sizes are present. The overstory canopy is discontinuous, and dominated by large (20+ inch) trees. Canopy cover is 40+ percent.

Historic Range of Variability

The silviculturist calculated the "historic range of variability" (HRV) of stand structural stages for each vegetation type, across the project area. The HRV is an estimate of the percentage of each stand structural stage that existed during pre-settlement times. The proposed project activities would not move the landscape away from cover type and structure targets that are based on HRV and future range of variability (FRV).

Single story old growth in the Dry Douglas-fir Vegetation Type is well below the historical range of variability for the Sanpoil analysis area. The proposed action treats 3617 acres in middle structure and 1370 acres in multi-story closed late structure with the intent of moving the area toward open single story late structure. While acres in middle structure will need a period of time and probably more treatments to grow into late structure, treatments in closed late structure will change to single story following treatments. The percentage of late open structure in dry Douglas-fir vegetation type will still be well below the historical range of 38-78%, but will see an increase over current conditions from 2% to 6.5%. Stands proposed for treatment in subalpine fir/lodgepole pine types are mainly in plantations to reduce densities or areas of mountain pine beetle.

Table 2: Historic Range of Variability by Vegetation Type compared to current conditions: table shows structural stage percentages, both current and historic, for each vegetation type within the planning area. Yellow color corresponds to structures that are above desired condition. Green corresponds to structures that are below desired condition.

Vegetation Type		Early	Mid Closed	Mid Open	Late Open	Late Closed	% of Planning Area
Douglas-fir dry	Current	13%	22%	46%	2%	16%	74%
	HRV	6-16	2-8	4-13	38-78	1-32	
Spruce/Subalpine fir	Current	39%	12%	43%	1%	4%	3%
	HRV	14-46	0	13-41	0	29-57	
Subalpine Fir/Lodgepole pine	Current	18%	7%	59%	0%	16%	22%
	HRV	45-65	0	33-53	0	3	
Non-Forest							1%
Total		16%	19%	49%	2%	15%	

Proposed Forest Management Action

The proposed treatments are needed to reduce tree density, increase stand vigor, and decrease the potential for insects, disease, and large wildfires. Treatments would be designed to respond to insect and disease pressures created by wildfires, wind throw, and overstocked stands. **Error! Reference source not found.** summarizes acres by treatment type for the proposed treatments. The treatment definitions follow the table. Refer to Appendix B Figure 3 for a map of proposed treatments.

Table 3: Estimated Acres of Treatment

Treatment	Acres/Miles
Silvicultural Treatments	
Commercial thinning (CT)	4,071
Commercial thinning with openings (CT-O)	1,269
Pre-commercial thin (PCT)	2,521
Small pine thinning (SPT)	524
Shelterwood Treatment (HSH)	293

Fuels Treatments	
Shaded fuel break (SFB)	2,481
Ladder fuel reduction (LFR)	30
Machine pile burn (MPB)	7,318
Hand pile burn/machine pile burn (HPB/MPB)	680
Underburning (UB)	8,764
System Roads	
Road Closure	3.03
Road Decommissioning	2.33
Temporary Roads	
Existing	7.97
New construction	3.65

Silvicultural Treatments

Variable Density Commercial Thinning (CT) - Treatments would target the smaller less vigorous trees and those infested by pathogens. This treatment will remove suppressed, intermediate and co-dominant trees, as well as genetically inferior trees left by past diameter limit cuts and trees with forest pathogen infestations. Existing clumps of healthy overstory will remain in the residual stand. The understory would be treated to isolate patches of multi-strata ladder fuels and open other areas to form single story structure. Following this treatment the stand will remain fully stocked and no planting is expected.

Commercial Thinning with Openings for Insect and Disease (CT-O) - This is similar to the variable density thinning but because of moderate-to-high levels of insect or disease within the units, small group openings will be created over up to 50% of the unit to reduce future ground fuel accumulations and increase the stands ability to withstand disturbance. Openings will be located in areas of insect and disease or very poor vigor (mainly dwarf mistletoe, root rot, and bark beetles). Understory will be treated to reduce ladder fuels. Openings may be planted with fire resistant larch or ponderosa pine especially in area where these species are lacking due to past management. This will add species diversity and resiliency to the stand.

Pre-commercial Thin (PCT) - Pre-commercial thinning is called for in non-merchantable stands that are overly dense (beginning to self-prune and lose vigor) or diseased stands where the majority of the trees are less than 7” DBH. The treatment would leave the largest, most vigorous disease free trees for the residual stand. Thinning the overstocked stands reduces the time needed to attain old growth structure, increases vigor (thereby reducing the susceptibility to disease), and can reduce the long-term probability of fire damage. Overstory trees that are spreading dwarf mistletoe may be girdled, felled or pruned to reduce spread to the understory. Girdling and felling of dwarf mistletoe infected trees would not be applied to trees over 21 inches DBH. The pre-commercial thinning treatments are located in old harvest units and plantations.

Small Pine Thinning (SPT) - This treatment is also a variable density thin similar to above, but these stands may be of only marginal commercial viability. These stands have pockets of mortality due to Ips and bark beetles (mainly Mountain Pine Bark Beetle). A stewardship project could employ removing dead and dying trees. (Planting may occur if needed to attain full stocking levels) Diameter at breast height in these units is approximately 4-12 inches. Units may include areas of pre-commercial only treatment as well. These stands are approximately 40 year old planted ponderosa pine stands. In such

stands, openings may occur, and the size will be reliant on current mortality, but is not expected to be more than 30 percent of the stand.

Shelterwood Treatments (HSH) - Release of large old remnant ponderosa pine by removing white fir and lodgepole pine. Several stands have insect and disease rates high enough to greatly limit the selection of leave trees. These will be cut to a heavy shelterwood leaving clumps of trees. Shelterwood will be used in the Sanpoil project where there are some large, old remaining ponderosa pines at rates of 2-5 trees per acre. These large remnant trees are few on the landscape. The rest of the stand stocking is made of white fir and lodgepole pine mostly of less than 100 years old and typically infected with dwarf mistletoe and root rots prevalent. The low stocking of the remnant early seral trees and lack of crop trees in the white fir and lodgepole pine do not allow for use of uneven-aged management as written in the Forest Plan. This prescription will release the remnant trees and regenerate ponderosa pine in the stand as a regeneration cut. The overstory ponderosa pine will not be removed.

Reforestation (PLANT)
Planting will be done as needed to restock stands and restore a more favorable species mix. Units planned for planting will be reforested with western larch and/or ponderosa pine seedlings following harvest according to Region 6 Specifications. These lands will be monitored and will be adequately restocked within five years after final harvest.

Fuels Treatments
There are two methods that would be used to treat small understory trees in this project. Ladder fuel reduction (LFR) and pre-commercial thinning (PCT). These methods are similar in that they remove small, usually non-merchantable trees from the understory. The goals vary in the conditions they are aiming to create. Pre-commercial thinning is called for in units where stands would benefit from treatment but trees are not of commercial size. Ladder Fuel Reduction is called for in units where understory trees are entwined with overstory canopy creating a potential ladder of fuel.

Ladder Fuel Reduction (LFR) - Ladder fuel reduction is used to meet fire management objectives. Ladder Fuels Reduction involves mechanically cutting understory trees 10” dbh and differs from PCT because it reduces the number of trees that are acting as ladders of fuels between the surface and the upper canopy. The desired stocking of remaining small trees varies and is dependent on the overall stand density and structure. LFR treatments are designed to reduce ladder fuels, thus reducing the potential for crown fire initiation and improving firefighter’s ability to control fires by keeping predicted flame lengths at four feet or less. A variety of methods may be used to complete LFR. Methods include hand felling with chainsaws, the removal of small diameter trees with a feller-buncher or the mulching of understory trees with a boom mounted or vertical shaft mastication head. LFR may be completed during the same entry as a commercial harvest. For example, a feller buncher could cut the small diameter trees and the commercial material at the same time as the overstory harvest.

Shaded Fuel Break Treatments (SFB) - Shaded fuel breaks are a non-commercial thinning treatment removing up to 7” DBH trees and spacing trees between 15 and 30 feet apart. Activity fuels would be piled and burned. Strategically placed shaded fuel breaks would reduce the size, intensity and effects of wildfires. Shaded fuel break treatments are focused along travel corridors and would help provide safe egress of local residents and forest users, as well as save ingress and egress of the firefighters in the event of a wildfire. These treatments also respond to guidance in the Ferry County Community Wildfire Protection Plan.

Underburning (UB) - Underburning involves controlled burning of surface fuels in order to reduce fuel loading. There are three different reasons to conduct underburning in the Sanpoil project which include:

Underburning as a follow up maintenance treatment, underburning of fuels generated by timber sale treatments in project harvest units, or underburning to reduce natural fuels buildup not associated with harvest treatments.

Underburning as a Maintenance Treatment - The desired goal of maintenance underburning, is to maintain conditions, using prescribed fire, which reduce extreme fire behavior and allow fire personnel to safely suppress a wildfire start, and maintain a historic fire regime in the project area. Surface fuels would be light, reducing potential surface fire severity. Open timber stands would reduce the potential for sustained crown fires. Crown base heights would be increased through the use of prescribed fire by pruning trees with low-hanging branches. Species composition would favor fire-resistant species, such as Ponderosa pine, Western Larch and mature Douglas-fir. Fire-related tree mortality would be reduced through burning when environmental conditions such as air temperature and soil moistures would be conducive to a low to moderate intensity fire.

Reintroducing prescribed fire to previously underburned units will maintain stand conditions that would allow the continued use of prescribed fire in the future to maintain ecosystem health and reduce fuel accumulations. Prescribed burning and commercial harvest has been used in the past to create the conditions that exist today. Implementation of this project would perpetuate these conditions for another 10-15 years, thereby maintaining historic fire intervals.

Underburning in Commercial Harvest Units - Underburning consists of igniting fuels at a measured pace during predetermined burning conditions. Underburning may be referred to as “jackpot burning” when fuels are distributed in patches and the patches are lit individually. The goals of underburning are to reintroduce fire into the ecosystem, reduce surface fuel loading created from tree removal activities, prepare seed beds for natural and planted regeneration, reduce natural fuel loadings and continuity, and / or improve wildlife habitat and browse conditions.
When the main objective of underburning is to reduce surface fuels a low intensity fire would be prescribed that limits mortality of overstory trees across the landscape to approximately 10%. Mortality caused by prescribed fire would typically occur in “clumps” or “patches” with differing degrees of severity (Finney et al, 2005). Historically a moderate severity patch may be up to 15 acres with mortality between 25 to 70%, with high severity patches less than 2 acres in size with mortality exceeding 70%. Underburning would favor fire-tolerant species (such as Ponderosa pine and Western larch) over fire intolerant species. This is in consideration that sudden wind gusts, aspect changes, and slight differences in surface fuel loadings and arrangement across a unit affect fire intensity and severity.

Underburning as Landscape Natural Fuels Reduction - Landscape Natural Fuels Reduction units are areas where underburning is the only fuel treatment proposed for a unit. Though LNF underburn units may be ignited separately from other units, many are adjacent to units proposed for underburning as a follow up to canopy or ladder fuel treatments. Including LFR areas allows for greater continuity and opportunity of reintroducing fire in a larger landscape block, as opposed to several smaller and fragmented units. Furthermore, burning larger landscape blocks decreases the need for fire line construction as there is a greater opportunity to use roads and natural features as fire breaks. Depending on weather and logistical hurdles some of the LNF units may not be completed.

Mechanical (MPB) and Hand (HPB) Piling and Burning of Fuels - Piling of fuels is a method of gathering limbs, tops, and whips (slash) from ladder fuel and canopy fuel treatments, and existing woody debris (natural fuels) for disposal. The piles are burned under safe conditions when fire is unlikely to spread; generally in the fall after conditions change to a damp weather pattern. Fuel piling may be done either with a machine, or by hand and are ignited by hand. In most cases, fuel piling occurs when terrain, access, or economics restrict the opportunity of fuel removal for biomass utilization and underburning is

not feasible. A certain amount of large logs and other woody debris are retained on site to meet wildlife habitat and soil nutrient requirements.

Mechanical Piling: Also called grapple piling, it is done by a machine that can pick up debris and place it on a heap. When piles are spaced throughout the treatment unit, they would not exceed 10 feet in diameter. If the piles are at designated landings, they can be much larger. To protect the soil, grapple piling would not be done by a bulldozer pushing debris into a pile (dozer piling). The need for mechanical piling will be based on a post-harvest exam of fuel loadings conducted by the fuels specialist or their designee.

Hand Piling: Fuels are hand piled where prescribed fire or machine piling is not feasible due to slope steepness, resource concerns, or lack of access. Piles would not exceed 10 feet in diameter and would be spaced throughout the treatment units. Some piles would be left unburned for wildlife habitat.

Fireline construction - A fireline is a break in the fuel bed which prevents the spread of fire. A sufficient width may range from a few inches dug with a hand tool to a dozer line many feet wide, depending on the fuel depth or arrangement, and anticipated fire behavior. Where needed, fireline may be used around underburn units including next to private land. The kind of fireline used depends on slope, access, and anticipated fire behavior. Hose lays may also be used to reinforce fireline in areas where an escaped fire would have a high risk of causing damage to resources and property. Though natural fuel breaks (like rocky areas and creeks) and roads would be used wherever possible to contain prescribed fire.

Hand Fireline Construction - On steeper ground and sensitive soils, crews would construct fireline by hand. This type of control line is typically used in areas with light natural fuels and poor road access. Hand line is generally 18-24 inches wide and down to mineral soil. A fuel break would be constructed with hand fireline consisting of cutting and dispersing surface fuels including brush, non-merchantable trees, and limbing of larger trees. The fuel break would be 15 feet wide straddling the fireline with 10 feet of clearing inside the burn unit and 5 feet outside the burn unit.

Machine Fireline - This type of control line uses a small dozer with a six-way blade so that the blade can be angled to minimize the size of the fireline. The object is not to create a scarring “catline”, but a minimal cut to expose mineral soil to a width of 18 to 36 inches, and a depth only sufficient to expose mineral soil. This method would not be employed on slopes greater than 35 percent or in RHCAs. A fuel break would be constructed by hand consisting of cutting and dispersing surface fuels including brush, non-merchantable trees, and limbing of larger trees. The fuel break would be 15 feet wide straddling the fireline, with 10 feet of clearing inside the burn unit and 5 feet outside the burn unit.

Road Management

The project will close 3.03 miles of road. The proposed action would decommission approximately 2.33 miles of NFS roads in the project area. These roads, and their use, are generally linked to riparian, and/or hydrologic resource damage and have been deemed unnecessary for future activities.

Commercial harvest under the proposed action would require an estimated 11.62 miles of temporary road construction and use of non-system roads to provide access to proposed units. Activities would include reconstruction on existing roadbeds, new temporary road construction, and restoration of existing non-system roads. About 7.97 miles of existing non-system roads would be used during the project. Rutting would be minimized with addition of the rock surface and with the running surface maintained. Upon completion of vegetation and fuels treatments, these roads will be obliterated and made hydrologically stable. About 3.65 miles of new temporary road would be constructed where no roadbed exists, requiring new excavation and embankment, surfacing, and installation of drainage structures. Newly constructed

temporary roads would be obliterated and made hydrologically stable at the completion of vegetation and fuels treatments. The project area includes over 67 miles of existing non-system road templates. These templates include old roads, jeep trails, skid trails, and may include features like. They were delineated from lidar digital elevation models using ArcMap. Many have not been field validated. In many cases these old templates may be overgrown and stable, where active restoration would not be a benefit. The non-system roads that are reasonably accessible and that have resource concerns would be restored through full obliteration or hydrologic stabilization. The remaining non-system roads would be allowed to continue to recover naturally.

Wildlife-Related Project Design Criteria

Along with the standard project practices (refer to standard wildlife practices document) criteria in the following table would be incorporated into the design of the proposed action. We have successfully implemented these practices with other vegetation management projects completed on the Forest. These practices have proven to be effective in avoiding or minimizing potential negative effects of vegetation management projects to native wildlife species. For unit location refer to Appendix B Figure 3.

Table 4: Project Design Criteria for Terrestrial Wildlife

Project design criteria	Target Species	Design Element	Management Framework
1. While the project is active prohibit unauthorized vehicle access on new temporary roads, brushed-out roads, and bermed roads.	forest carnivores, big game	roads	Christensen et al. 1993, Lynx Biology Team 2013, Rowland et al. 2005, Trombulak and Frissell 2000
2. Post-project, ***effectively*** close the temporary roads by de-compacting the roadbeds, or by installing boulders, slash, or earthen berms on the road entrances. Establish vegetation on exposed soils and mask road entrances using trees or shrubs.	forest carnivores, big game	roads	Christensen et al. 1993, Lynx Biology Team 2013, Rowland et al. 2005, Trombulak and Frissell 2000
3. Where the opportunity exists and is appropriate, maintain hiding cover (hiding cover is defined as vegetation/topography capable of hiding 90 percent of an elk at a distance of 200 feet) along open road segments lying adjacent to newly created openings by retaining clumps/patches of shrubs, and seedling/sapling/pole-sized trees. To the extent feasible, maintain this cover during post-harvest site preparation. The intent is to limit disturbance to wildlife from motorized vehicles, decrease vulnerability to shooting, and discourage OHV travel off-roads. Units in winter range which will create openings in which this applies to: 570, 13, 71, 122, 187, 227, 161	forest carnivores, big game	roadside hiding cover	Montgomery et al. 2013, USDI et al. 1986
4. Maintain no-cut buffers within 50 feet of all wetlands. Wetlands occur in or adjacent to units: 45, 69, 68, 30, 94, 97, 24, 219, 218, 225, 85, 91, 90, 82, 195, 11, 12, 21, 199	big game, amphibians, waterfowl, landbirds, invertebrates, etc.	wetlands	Forest Plan, Altman 2000, Duncan 2008, Foltz-Jordan 2010, 2011, Gervais 2015, USDA 1995
5. Timing restrictions on all harvest related activities (including layout) from March 1st through August 31st, unless waived by the wildlife biologist, will be implemented for portions of units 70, 549, 345, 535, 13, 545, 27, 69, 67, 548, 66, 3, 342, 41, 40, 338, 38, 229, 529, 46, 47, 48, 49, 223, 102, 107, 101, 110, 108, 111, 112, 137, 164, 556, 174, 166, 97, 167, 138, 98, 538, 103, 24, 25, 561,	goshawk	late struct. stage stands, large trees	Lowe 1995, Reynolds et al. 1992

Project design criteria	Target Species	Design Element	Management Framework
552, 30, and 546.			
6. Units 42, 342, 49, 41, 101, 107, 138, 26, 24, 561, 137, 174, 164, 556 and 546 will have portions in which treatment will not be permitted due to presence of goshawk nest. No timber activities are permitted to occur within a 30 acre buffer of a nest.	goshawk	late struct. stage stands, large trees	Lowe 1995, Reynolds et al. 1992
7. For all units possible retain: Size (d.b.h.) Type 21+" all conifers, except those that might exist within new road or equipment corridors, and landings. 16+" broken topped and hollow trees (as many as feasible up to 10/acre) 16+" 4-7 snags/acre 14+" live trees with old raptor nests	Canada lynx	lynx habitat components	Interagency Lynx Biology Team 2013
	Goshawks, woodpeckers, pine marten, raptors, landbirds, etc.	late struct. stage stands, large trees	Altman 2000, Green et al. 1992, Lowe 1995
	primary cavity excavators, pine marten, small mammals, invertebrates, forest grouse, raptors, bats, landbirds	snags & down logs	Altman 2000, Bull et al. 1997, Gervais 2015, Lowe 1995, Mellen-McLean et al. 2013
	raptors, dusky grouse, primary cavity excavators, bats	nest, roost, foraging trees	Bull et al. 1997
8. Retain hardwood trees except those that need to be felled within new equipment or road corridors, and landings.	landbirds, forest grouse, big game	hardwoods	Altman 2000
9. Down logs may only be removed when conditions exceed: Ponderosa pine- 3-6 pieces per acre with smallest diameter being 12". Piece length >6ft. and total lineal length equaling 20-40ft. Mixed conifer- 15-20 pieces per acre with smallest diameter being 12". Piece length >6ft. and total lineal length equaling 100-140ft. Lodgepole pine- 15-20 pieces per acre with smallest diameter being 8". Piece length >8ft. and total lineal length equaling 120-160ft.	primary cavity excavators, pine marten, small mammals, forest grouse, raptors, bats, landbirds	snags & down logs	Altman 2000, Bull et al. 1997, Gervais 2015, Mellen-McLean et al. 2013
10. Where the opportunity exists, strips or clumps of trees and shrubs would be maintained along open roads located adjacent to areas of shelterwood harvest. The intent would be to limit line-of-sight distances from the road into the harvested unit. Shelterwood Units include: 5,47,70,94,103,138,181,214.	primary cavity excavators, pine marten, small mammals, invertebrates, forest grouse, raptors, bats, landbirds	snags & down logs	Lowe 1995
11. Any forest management actions which alters the canopy shall not occur within 150 meters of hibernacula or maternity sites. Portions of units 86, 116, and 117. These buffers will be implemented unless otherwise stated by the west zone wildlife biologist.	Sensitive bats	Hibernacula and maternity sites	Ormsbee 2001, Hayes and Wiles 2013

Project design criteria	Target Species	Design Element	Management Framework
12. Timber harvest will not occur within a 400 meter buffer surrounding the mines with proposed units from September 15th to May 15th in order to protect any bats wintering. Units 86, 532, 93, 215, 116, 117. These buffers will be implemented unless otherwise stated by the west zone wildlife biologist.	Sensitive bats	Hibernacula and maternity sites	Ormsbee 2001, Hayes and Wiles 2013

Wildlife-Related Mitigation

The following measures might be necessary to mitigate for unforeseen circumstances or project effects that are difficult to accurately predict. These measures have been highly effective when incorporated into similar projects completed on the Forest. Our ability to implement these actions is high.

Protect TES Species and Wildlife Activity Sites - If a TES species is observed, or a wildlife activity site (den, nest, roost, rendezvous site, etc.) is discovered in the project area, consult with the district biologist on measures required to protect the animal or site.
Timing: project planning through post-sale phases.
Responsibility: all FS employees and private contractors.

Maintain the Effectiveness of Closed Roads -Monitor all closed roads used for the project for 5 years. If a given closure is receiving unauthorized motorized use, implement actions necessary to improve the effectiveness of the closure. These could include placing boulders or cement posts on the side of gates to block OHV access, replacing gates with earthen berms or boulders, seeding and planting berms, piling slash or root wads in the road entrance, etc.
Timing: post-closure of the individual road
Responsibility for monitoring: wildlife biologist
Responsibility for implementation: wildlife biologist and/or CNF engineering personnel

Create Snags – If snag density does not meet HRV standards, about 4-7 snags per acre with d.b.h. ranging from 8-46", (this is dependent upon vegetation type) create snags from live green trees within created openings (i.e., shelterwood harvest), in order to mimic habitat levels in un-managed stands, as determined by the biologist. Snag creation could be accomplished by topping trees with a mechanical harvester, topping trees by hand with a chainsaw, or top-girdling trees with a hand saw and ax.
Timing: during or post-sale
Responsibility for monitoring: wildlife biologist
Responsibility for implementation: wildlife biologist and /or timber sale administrator

Wildlife Topics and Issues Addressed in this Analysis

Desired Condition of Wildlife Habitats

In the Sanpoil project area, there is presently an over-abundance of stands in middle structural stages and a deficit of stands in both the early and late structural stages, relative to historic conditions. Timber harvest would move the project area closer to the historic range of variability (HRV) for stand structural stages (Lowe 2005). Timber harvest would create forest openings any palatable shrubs and green forage plants growing in these new openings would have improved access to sunlight, water and soil nutrients. They should respond by putting on abundant and nutritious new growth, enhancing foraging opportunities for big game and other animals over the short to mid-term. Existing late structural stage stands would not be harvested. Where trees in mid-structural stage stands would respond to stocking control, commercial

thinning would occur. This harvest prescription would promote the growth of the largest, fullest crowned trees, accelerating the overall stand development towards late structure. As a result, additional habitat for old growth associated species could be recruited in the project area over the long-term.

Timber stands on the lynx range would be managed according to recommendations in the Canada Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team 2013). High elevation subalpine fir/spruce stands with concentrations of downed logs would be reserved from harvest to provide potential den habitat for lynx. Timber harvest would create openings within stands in middle structural stages. Within about 15 years, these openings would fill in with young conifers and could be providing enough low cover and browse to be utilized by snowshoe hares; the primary prey of lynx.

Wildlife Issues

The proposed project does not create major wildlife issues, and during public scoping no wildlife concerns were identified.

Wildlife Resource Indicators and Measures

The following table displays the resource indicators and measures for the key wildlife issues related to this project.

Table 5. Resource indicators and measures for assessing project effects relative to the key wildlife issues

You have a measure	Resource Indicator	Measure (Quantify if possible)	Source
Lynx habitat components	prey habitat	Provide a mosaic of stand types including dense, young stands suitable for snowshoe hares (primary prey) and mature, multi-storied stands for tree squirrels (alternate prey).	Interagency Lynx Biology Team 2013
Lynx habitat components	den habitat	Maintain or promote mature, subalpine fir / spruce stands with root wads / log jackpots over at least 10 percent of the lynx analysis unit (LAU).	Interagency Lynx Biology Team 2013
Lynx habitat components	unsuitable habitat	Ensure that < 30% of the LAU is in natural or created openings. Change no more than 15 percent of an LAU to an unsuitable condition in a 10 year period.	Interagency Lynx Biology Team 2013
Big game seclusion	motorized access	open route miles & densities, drivable route miles & densities	Rowland et al. 2005, Trombulak and Frissell 2000
Grizzly bear seclusion	core habitat	acres further than 500 meters from open and restricted-use roads	USDI et al. 1986

Pre-field and Field Review

We reviewed wildlife sighting records from the project area and vicinity in the geographic information system (GIS) databases managed by the Washington Department of Fish and Wildlife (WDFW), the Washington Department of Natural Resources Natural Heritage Program, and the CNF. We reviewed documentation of past species specific wildlife surveys completed in the area. Over the course of 4 field seasons, walk-through exams were conducted to assess wildlife habitats in the proposed harvest units. Lastly, we used formal stand exam data, LiDAR data, aerial photo interpretation, and existing GIS layers to map potential habitats for individual species.

Incomplete and Unavailable Information

Wildlife Population Estimates

Accurate estimates of wildlife populations relative to the project area are difficult if not unfeasible to obtain. It is unlikely that all activity centers such as dens or nests have been found. This is due to the limitations of detection methods and the level of effort and time that would be required for a complete census. Some species occur at very low densities and have vast home ranges (e.g. wolverine), making them very difficult to detect. A species' home range may only partially overlap the project area, or may shift into or out of the project area over time. Additionally, the State of Washington manages wildlife populations and the Forest Service manages habitat for species. Lacking complete information on species distributions and abundance, when habitat occurs on which a species depends, we generally consider the habitat as potentially occupied.

Incidental wildlife observations and those recorded during species-specific surveys are records of presence at a given point in time. We may be able to surmise which local habitats are important to the species based on where and how often the animals were detected. If wildlife activity centers (such as a raptor nest) are found during project planning or preparation, we would protect the sites as needed by adjusting the boundaries of treatment units, and/or imposing project timing restrictions in the area.

Although our knowledge of species presence and density is imperfect, we must still ensure that vegetation management activities in the project area do not directly, indirectly, or cumulatively impact the viability of wildlife species across the Forest. To accomplish this, we follow management guidance in recovery plans and use the best available science such as conservation assessments. These documents are compiled by taxon experts responsible for the conservation and/or recovery of the species. We must also ensure that the project incorporates Forest Plan standards and guidelines for wildlife, and current management recommendations in Youkey (2012) and Mellen-McLean et al. (2012) for maintaining species viability. These resources provide an assessment of "source" habitat levels at the regional and Forest-wide scales. They identify threats to the species, and conservation strategies.

Species listed as game animals in Washington State (e.g., elk, deer, forest grouse, furbearers) are monitored by WDFW through the collection of annual trend count and harvest data, and on-going research. WDFW uses these data to manage for healthy, productive populations of game species at sustainable harvest levels. This monitoring and adaptive management further ensures that these species will persist on the Forest over time.

Road Closure Effectiveness

Brushed out roads and temporary roads built with this project would be closed to motorized travel by the public at all times. Not all road closures are effective and some of these closed roads could be breached by motorized vehicles. This could lead to an overall decrease in seclusion habitat available to wildlife in the project area, and an increase in harvest levels, both legal and otherwise. It is difficult to accurately predict beforehand which, if any, road closures could be breached. This analysis assumes we would achieve a high degree of closure effectiveness in the project area based on the following;

- The project would require about 11.6 miles of temporary roads. Temporary roads constructed for use will be obliterated after they have served their purpose. The road will be decompacted to 18" minimum process, fill material will be returned to cut slope, and all excavated soil returned to original locations as much as feasible. Original land profiles will be re-established to the maximum extent possible. All stumps, slash, and vegetative debris from construction will be

returned to the obliterated road surface. Special attention will be given to road entrances to prevent any further use of road. Extra debris, imported stumps, earth berm and/or slash piles, rocks, or re-contouring entrance as approved by Forest Service will be used to effectively prevent any future use of the roads. Following obliteration, all areas of exposed soil not effectively covered by slash and debris will be seeded. To the extent possible, given terrain features, treatments to close unit access roads should camouflage the entrance of the unit access road from existing system roads so they are not obvious and are not accessible by OHV's.

- We have rarely documented breaches on roads which have been thus "put to bed" and none have had sustained motorized use.
- Closed roads that have been recently breached would have their closures re-worked to improve their effectiveness. This could involve moving a gate to a better location, re-installing earthen berms on the road entrance, piling slash in the road prism, etc.
- The project proposal would include monitoring road closures for five years. If we were to detect a breach during that time, we would take steps to re-work the closure. We would continue to periodically monitor and improve the closure as necessary.

Threatened and Endangered (T&E) Species

Regulatory Framework

Section 7 of the Endangered Species Act of 1973 (ESA) requires all federal agencies, in consultation with the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS), to insure that their actions are not likely to jeopardize the continued existence of listed threatened, endangered or proposed species, or adversely modify their habitat. A biological evaluation/assessment (BE/BA) must be completed for all Forest Service planned, funded, executed or permitted programs and activities to determine their possible effects to species listed under the ESA (FSM 2672.4). Current management direction/recommendations for threatened, endangered, and proposed species on the Colville National Forest can be found in the following documents:

- Colville National Forest Land and Resource Management Plan (USDA 1988), as amended,
- Endangered Species Act of 1973 (ESA),
- Forest Service Manual and Handbooks (FSM/H 2670/2609),
- Migratory Bird Treaty Act of 1918 (MBTA),
- Migratory Birds Executive Order (EO) 12962 of January 10, 2001
- National Environmental Policy Act of 1970 (NEPA),
- National Forest Management Act of 1974 (NFMA),
- Recovery Plans, Conservation Assessments, and other species specific documents,
- Regional Forester policy and management direction.

The Sanpoil Project Area is entirely included within the boundaries of Ferry County, Washington. For Ferry County, the USDI Fish and Wildlife Service (FWS) presently lists no bird or mammal species as endangered, one bird (yellow-billed cuckoo, *Coccyzus americanus*), one fish (bull trout, *Salvelinus confluentus*), and two mammals (Canada lynx, *Lynx Canadensis* grizzly bear, *Ursus arctos*) as threatened, and one mammal (North American wolverine, *Gulo gulo luscus*) as proposed for listing under the Endangered Species Act (ESA) of 1973 (https://www.fws.gov/endangered/ and IPaC assessment, accessed 1/30/2018 and one plant (whitebark pine, *Pinus albicaulus)* listed as a candidate species.

Abbreviations used in the table:
E=federally endangered T=federally threatened P=federally proposed C=Candidate

Table 6: Threatened (T), endangered, proposed, and candidate terrestrial wildlife species listed for the CNF (species in shaded blocks will be addressed in this report since they have habitat in the project area and there will be an effect from the project activities.)

Species	Status	Habitat present?	Documented in area?	Habitat
Canada lynx (*Lynx canadensis*)	T	Yes	Yes	High elevation forests. Primary lynx habitat includes: lodgepole pine, subalpine fir, Engelmann spruce, and aspen cover types. Lynx foraging habitat includes dense young stands of lodgepole pine, mixed conifer/ hardwood stands with an understory shrub layer, or mature multi-level stands. Lynx denning habitat is characterized by large woody debris and ample overhead cover.
Grizzly bear (*Ursus arctos*)	T	Yes	No	Spring foraging habitats include low to mid - elevation riparian areas, meadows, parklands, etc. Summer / fall foraging sites include mid - high elevation, berry producing shrubfields. Grizzlies often den in alpine or subalpine areas with deep soils.
North American wolverine (*Gulo gulo luteus*)	P	Yes	No	Den in higher elevation rock slides, caves, and crevices; often in glacial cirque basins. They forage in all higher elevation forested habitats
Bull trout (Salvelinus confluentus)	T	No	No	Critical habitat not present. Natural Fish blockage on Sherman Creek. Bull trout not found in surveys.
Whitebark pine *(Pinus albicaulus)*	C	Yes, Proposed treatments are outside of occupied habitats for this species.	Yes	Whitebark pine is a five-needled pine which grows at high elevations (typically above 5,500 feet). This tree species has been greatly reduced throughout its range due to an introduced pathogen (blister rust) and mountain pine beetle infestations.
Woodland Caribou (*Rangifer tarandus caribou)*	E	No	No	Mature montane forests of western redcedar/western hemlock, and subalpine fir/Engelmann spruce above 4,000 feet in elevation. Specifically the Selkirk Mountains located in Pend Oreille County
Yellow-billed cuckoo (*Coccyzus americanus)*	T	No	No	Large cottonwood galleries and other dense riparian woodland habitats. Range for the species does not include the northeastern part of the state of Washington.

Canada lynx, federally threatened

Existing Conditions

The population of lynx in northeastern Washington declined dramatically from 1970 to the mid-1980s and the Kettle Range has not supported a population of reproducing lynx in the last 20 years. From 2009 to 2011, the CNF and WDFW conducted a lynx hair-snare survey on the Kettle Crest (Loggers and Dotts in prep.) using National Lynx Detection Survey Protocol (McKelvey et al. 1999, McDaniel et al. 2000) but no lynx were detected, thus confirming that a reproducing population of lynx does not occur in the Kettle Range. A brief camera trap survey occurred from 2016-2017 during that survey period three photos in and

just outside of the Sanpoil project area captured lynx presence. It is thought that the three photos captured one individual lynx. An extensive camera trapping endeavor will begin summer 2018 to reassess the lynx population status throughout the Kettle Range as it has been several years since a thorough search has occurred.

The Sanpoil project area contains the West Sherman Lynx Analysis Unit (LAU) and the Hall Creek LAU. Approximately 11,876 acres of the West Sherman LAU occurs within the project area and approximately 3,755 acres of the Hall Creek LAU occurs within the project area. The LAUs are located at the south end of a block of 14 LAUs that are distributed on either side of the crest of the Kettle Range. Most of the LAUs consists of plant associations that support primary habitat for lynx.

Lynx Habitat Components

Existing Habitat Levels - We mapped potential lynx habitats in the West Sherman LAU based on formal stand exams, walk through exams, LiDAR imagery of tree heights and canopy closure, and aerial photo interpretation. Table 7 displays the existing habitat conditions for lynx in the LAUs within the project area.

Table 7. Lynx habitat indicators and measures for the existing condition

Resource Indicator	Measure	Acres	% of LAU
West Sherman LAU within project area		**11,882**	**100%**
Primary prey habitat	Provide a mosaic of stand types including dense, young stands suitable for snowshoe hares.	3,356	28%
Marginal and/or alternate prey habitat	Provide a mosaic of stand types including mature, multi-storied stands suitable for tree squirrels as well as connectivity.	2,599	22%
Den habitat	Maintain or promote mature, subalpine fir / spruce stands with root wads / log jackpots over at least 10 percent of each LAU.	3,391	29%
Unsuitable habitat	Ensure that < 30 percent of an LAU is unsuitable for lynx (includes recently created openings)	550	4%
Non-lynx habitat	Meadows, rock, open water areas below 4,000 feet.	1,986	17%
Hall Creek LAU within project area		**3,755**	**100%**
Primary prey habitat	Provide a mosaic of stand types including dense, young stands suitable for snowshoe hares.	120	3%
Marginal and/or alternate prey habitat	Provide a mosaic of stand types including mature, multi-storied stands suitable for tree squirrels as well as connectivity.	940	25%
Den habitat	Maintain or promote mature, subalpine fir / spruce stands with root wads / log jackpots over at least 10 percent of each LAU.	2,274	61%
Unsuitable habitat	Ensure that < 30 percent of an LAU is unsuitable for lynx (includes recently created openings)	0	0

Non-lynx habitat	Meadows, rock, open water areas below 4,000 feet.	421	11%

Primary Foraging Habitat – Snowshoe hares are the primary prey of lynx. Hare populations are highest in moist coniferous forest stands that are very dense, young, and that have ample overhead cover and browse. In the winter, dense saplings or mature multi-layered stands maximize availability of food and cover for snowshoe hares and it is important that cover is present above varying snow depths throughout the winter. In northeastern Washington, lodgepole pine and Douglas-fir are the most important browse species for snowshoe hare. In the Kettle Range, this habitat typically occurs in regenerating burns or in stands that were harvested approximately 15 to 20 years ago.

Alternate Foraging Habitat - During times of hare scarcity, lynx focus more on alternate prey such as red squirrels, grouse, and infrequently, ungulates (Ruggiero et al. 1999). At the southern extent of lynx range (including the CNF) the main alternate prey appears to be red squirrels. Mature forests with good canopy closure, large amounts of coarse wood on the ground, and good cone production, tend to support larger populations of red squirrels. We type stands with multi-stories, large trees present, and good overhead canopy, as alternate foraging habitat.

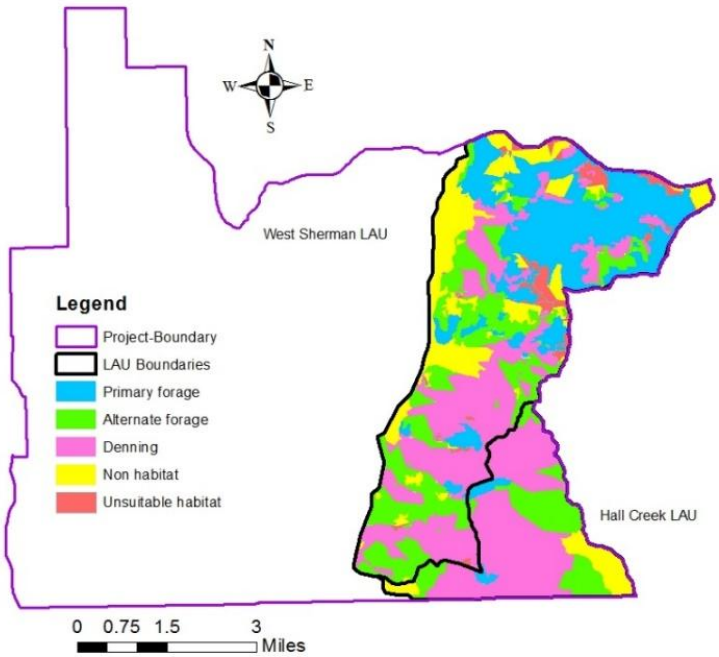
Denning Habitat - Lynx den sites are typically located in mature spruce/fir stands or mixed forests of spruce and birch. Forest structure at these sites seems to be more important than forest cover type. Areas having large woody debris (such as blow-down pockets) and ample overhead cover are preferred by lynx for denning. When mapping den habitat on the CNF, we look for stands in subalpine fir/spruce cover types, with multi-stories, good overhead canopy, and large down wood. There are no known active or historic lynx dens in the West Sherman or Hall Creek LAUs. For denning habitat to be functional, it must be in or adjacent to foraging habitat (Interagency Lynx Biology Team 2013).

Unsuitable Habitat - Habitat that could but currently does not provide connectivity habitat or any form of habitat used by lynx is called unsuitable habitat. Unsuitable habitat includes recent regeneration harvest or other disturbance-created openings that have the potential to provide habitat for lynx, but presently do not have enough vegetative cover to be used by the animals to an appreciable degree. These are stands in the stand initiation structural stage. After 5-10 years, shrubs and trees should have grown enough cover for lynx to travel through these sites. No more than 30 percent of an LAU should consist of habitat that is unsuitable for lynx. In addition, forest management should not change more than 15 percent of lynx habitat within a LAU to an unsuitable condition within a ten year period (Ruediger, et al, 2000).

The unsuitable habitat which occurs within the LAU is classified as unsuitable due being in the stand initiation structural stage. There have not been any timber harvests in the past decade that would have created the open conditions to cause the habitat to be currently unsuitable. Currently 4% of the West Sherman LAU is classified as unsuitable.

Non-lynx Habitat - Non-lynx habitats include; open water, rock, forest openings such as shrublands, meadows, and powerline corridors, dry forest stand types, and forest stands below 4,100 feet that are removed from spruce/fir vegetation types.

Figure 1. Distributions of lynx habitat conditions in the portions of the West Sherman and Hall Creek LAUs within Sanpoil Planning Area



Forest Roads and Trails - Lynx have been known to use roads as travel-ways where there is adequate cover on both sides of the road. Herbaceous plants and shrubs that grow along road edges can attract hares. It is possible that lynx hunting near roads could be more susceptible to predation or human-caused mortality. However, "at this time, there is no compelling evidence to recommend management of road density to conserve lynx" (Ruediger et al. 2000). Neither the 2000 version nor the 2013 version of the LCAS provided a recommendation for target road densities on the lynx range.

Environmental Consequences

Direct and Indirect Effects –

Vegetation management actions would occur over approximately 3,638 acres of the LAU but only 2,587 acres are in lynx habitat. Table 8 displays the acres of harvest in the LAU by harvest prescription, not including proposed harvest in stands typed as non-lynx habitat.

Table 8. Proposed actions approximate acreage in the LAUs (excludes treatments in non-lynx stands)

Prescriptions	Denning habitat	Marginal habitat (alternative prey habitat)	Primary foraging habitat	Existing unsuitable habitat	Total
Pre-commercial thin	143	119	444	87	793
Commercial thin	286	311	40	0	637
Shaded fuel break	144	228	18	0	394
Small Pine Thinning	15	5	0	0	20
Under burning	286	461	0	0	747
Total	874	1,124	502	87	**2,587**

Den Habitat – About 874 acres of stands that currently provide some denning habitat would be treated. Most of these stands will retain pockets of existing overstory and create openings. Though the initial result will be a decrease in denning habitat quality in the stand for about 15 years, the juxtaposition of leave islands of older trees interspersed within a matrix of younger trees will improve denning habitat in

the long term. There are no known lynx den sites in the LAUs. The normal operating season in timber sale contracts generally starts July 1 to avoid soft roads and wet soils. Contract activities in higher elevation areas are likely to be further delayed. Thus, the potential for the project to disturb an active lynx den should be insignificant or discountable.

Primary Prey Habitat – Approximately 502 acres of primary prey habitat would be treated within the West Sherman LAU which would contribute to temporary loss of primary prey habitat and increase unsuitable habitat to 1,052 acres or approximately 9% of the LAU. Although there would be this immediate loss, within 15-20 years this treatment will create good quality habitat in that time frame within the LAU. As these areas will grow out of suitable conditions for snowshoe hares in about 10 years this will ensure presence of habitat in the future.

Alternate Prey Habitat - Treatment is proposed in approximately 1,124 acres of marginal lynx habitat which is also considered alternative prey habitat. Habitat quality for tree squirrels could be reduced for up to 20 years in relation to the amount and heterogeneity (clumpiness) of the canopy retained in the harvested units. In the long term, most of the harvested areas will provide better habitat for snowshoe hares than if they remained on their current developmental pathways. Within about 15-20 years of harvest, good quality browse and overhead cover for snowshoe hares could develop in created openings where the young trees are sufficiently dense.

Unsuitable Habitat - Openings created through timber harvest would sometimes exceed 100 meters in width. Lynx would be reluctant to cross these larger openings due to their lack of concealing cover; particularly in the winter (Interagency Lynx Biology Team 2013). With this change, the amount of unsuitable habitat created by harvest, would remain below 30% of the LAU.

Table 9. Comparison of lynx habitat measures between no action and the proposed action

Resource Indicator	No Action West Sherman LAU acres (% of LAU)	Proposed Action West Sherman LAU	No Action Hall Creek LAU	Proposed Action Hall Creek LAU
Primary prey habitat	3,356 (28%)No immediate change; loss will occur to forest succession in 10+ years	3,404 (28%) Initial loss of 502 acres which will be potentially recruited in 5-15 years; plus 550 acres of unsuitable habitat will grow into marginal prey habitat with 5 years and continue to improve	120 (3%) No immediate change; loss will occur to forest succession in 10+ years	120 (3%) No immediate change; loss will occur to forest succession in 10+ years
Alternate prey habitat	2,599 (22%)	1,771 (15%) Reduced quality on 828 acres due to harvest for 5-10 years	940 (25%)	644 (17%) Reduced quality on 296 acres to due harvest for 5-10 years
Den habitat	3,391 (29%)	Reduction of quality on 703 acres, still considered denning habitat	2,274 (61%)	Reduction of quality on 171 acres, still considered denning habitat
Unsuitable habitat	550 (4%) Habitat will start to grow into marginal prey or denning habitat with 5 years	502 (4%) Creation of about 502 acres due to harvest, existing will grow into prey or den habitat keeping the amount of unsuitable habitat the same	No unsuitable habitat present at this time	No change at this time

Habitat Connectivity – Habitat connectivity would be reduced but not eliminated by the project. Once the project is complete, the bulk of the project area would remain un-managed and continue to provide dense cover for dispersing wildlife. Lynx would be reluctant to traverse the larger openings, particularly during winter, due to the lack of concealing cover on these sites. Where timber stands on the lynx range are commercially thinned, horizontal cover at ground level would be degraded, but not completely removed.

Cumulative Effects

Cumulative effects are evaluated within each individual LAU as directed by USDI 2001. As the entire West Sherman and Hall Creek LAUs are FS lands and no other projects as described in Appendix A: Table 11 and Table 12 are occurring within the LAUs there are no cumulative effects at this time.

Design Elements (DE) and/or Mitigations (MI)

Refer to Table 4 design elements 1, 2, and 7.

Effects Determination

Actions may cause the one recently documented individual to be displaced from the area during project activities but is not likely to have significant impacts to the individual. Regeneration harvest would increase the amount of unsuitable habitat (openings) for the next 5-15 years in the LAU. Lynx would tend to avoid the larger openings, but there enough forest cover would be retained on the landscape for animals to easily disperse through the area. In 15-20 years openings created during the project could grow dense enough to provide quality snowshoe hare habitat. The proposed action would be consistent with the best available science on lynx management. Based on these considerations, the proposed action may affect but is not likely to adversely affect lynx or lynx habitat.

Grizzly bear, federally threatened

Management Framework

The Sanpoil project lies outside of the recovery area and within lands classed as Management Situation 5 for grizzly bears (USDI et al. 1986). Grizzlies rarely occur in these areas although they contain some suitable and available habitats. Grizzly habitat needs are not a necessary consideration on these lands, but maintenance and improvement of habitat is an option (USDI et al. 1986).

Existing Conditions

There have been no confirmed observations of grizzly bears from in or near the Sanpoil project area since salmon were eliminated following construction of Grand Coulee Dam which was completed in the early 1940s, and before then sightings were rare (Bader 2000). The closest documented recent sightings are photographs from remote cameras in the Kettle Wedge (Washington Department of Fish and Wildlife 2013), which is greater than 25 miles away.

Grizzly Bear Habitat Components

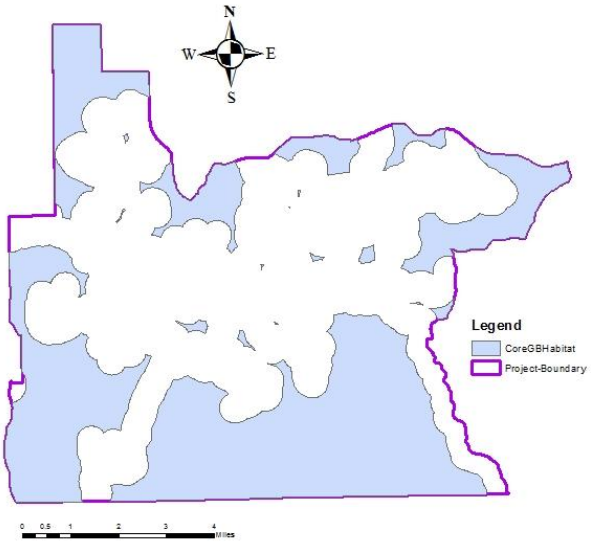
Hiding Cover - Hiding cover for grizzly bears is defined as vegetation capable of hiding 90 percent of a bear at a distance of 200 feet (USDA et al. 1990). This habitat component is most important along open roads. There is no established guideline for providing hiding cover for grizzlies outside of recovery areas. Virtually all forest stands in the area are presently providing hiding cover.

Den Sites - On the CNF, active grizzly bear dens have not been documented outside the Selkirk Mountains Grizzly Bear Recovery Area.

Seclusion - Core habitat for grizzly bears is defined as areas lying further than 500 meters from open and restricted (gated) roads and motorized trails (USDI 2001, USDA 2011). Within this 500 meter "zone of influence", grizzly bears are most prone to being disturbed and displaced from suitable habitat by encounters with vehicle traffic or people on foot. The risk of a bear being shot by a poacher, or accidentally shot by a legal black bear hunter, is also higher near drivable roads. The higher the road density is in a given area, the fewer acres of core habitat and the greater the risk of human-caused bear mortality. Approximately 45% of the area consists of habitat farther than 500 meters from an open road (

Figure 2). There is no direction to manage for specific levels of core habitat or road densities for grizzly bears outside of designated recovery areas for the species.

Figure 2. Seclusion/core habitat for grizzly bears in the Sanpoil project area



Environmental Consequences

Direct and Indirect Effects -

Forage Resources - Timber harvest proposed with the proposed action would reduce the overhead tree canopy in many stands that are typically densely stocked with immature trees. Where they exist in the areas proposed for harvest, forage plants utilized by bears could benefit from the increase in available sunlight, and the reduction in competition for water and soil nutrients. Grasses and other green forage plants could quickly become more palatable and productive. Berry crops could be enhanced over time. These potential effects would likely be best realized where timber harvest creates openings.

The proposed action would employ low-intensity burns to reduce forest fuel loads on about 8,764 acres. Prescribed fires would thin out dense areas of conifer regeneration and consume litter and down wood on the forest floor. The above-ground portion of forage plants eaten by bears could be burned. However, nutrients would be released into the soil from the ash of consumed vegetation and dead material and forage plants should quickly respond with profuse sprouting of nutritious and palatable shoots from their intact root systems. The quality and productivity of green forage plants should continue to improve until about 15 years following burning. It would take perhaps 3-7 years for burned, berry-producing shrubs to re-gain their pre-fire coverage (Coates and Haeussler 1986).

Hiding Cover - Within temporary road corridors, logging equipment corridors, and openings created by timber harvest, hiding cover would be degraded for approximately 5 years, less if considering conditions during summer when leaves are on the shrubs and small deciduous trees.

Post-harvest fuels treatments should have minor and mostly short-lived (1-3 years) impacts to hiding cover. Because prescribed fires are lit when conditions would not result in a stand-replacement fire, unburned patches of regeneration will remain. Even in areas that are well blackened, some degree of horizontal cover would be provided by the skeletons of shrubs and young trees, partially burned logs, and live and dead tree boles. Upland shrubs, grasses, and forbs would quickly re-sprout from their root systems and regain much of their above-ground biomass within a few growing seasons.

Den Habitat –During the critical period for bears when they first emerge from the den (March - May), timber sale operations on the CNF are usually closed in order to protect saturated soils and soft roadbeds. Thus, the potential for the project to disturb bears in the den or during the period following den emergence, should be insignificant or discountable.

Seclusion - The level of human disturbance in the project area would increase for the duration of the project. If a bear were to occur in the area, it would likely to avoid areas of ongoing activities, particularly where heavy equipment was being operated. Nearly all the existing closed roads in the project area could be opened during harvest activities, though not all would be open at the same time. Additionally, approximately 3.65 miles of temporary road segments would be constructed to access timber stands for management. For the duration of the project, motorized travel by the public on all roads currently closed would be prohibited. While project activities are occurring on re-opened or temporary roads, the amount of core habitat could be reduced in the project area. Post project, all roads opened for the project would be reclosed or obliterated so the amount of core area will return to its pre-project level.

Post-project, about 14.65 miles of road, including temporary road would be closed. 2.33 miles of road will be decommissioned. Post-project, the Forest Service would monitor closed roads in the area for five years and would take any steps necessary to address breaches and improve the effectiveness of road closures.

Cumulative Effects

The cumulative effects area for grizzly bear can be described as the Sanpoil project area. There are cumulative effects which will occur to grizzly bear habitat due to the overlap of commercial harvest occurring on private lands within the project area during the same time frame that this project will be occurring. (Refer to Appendix A: Table 11 and Table 12) These cumulative effects will be the same effects as described with the Sanpoil project effects. The resulting effects will include an additional decrease in hiding cover for approximately 5 years, a decrease in seclusion habitat due to an increase in human disturbance, and a potential increase in forage habitat. In consideration of these cumulative effects we are still meeting forest plan standards and guidelines for grizzly bear habitat.

Design Elements (DE) and/or Mitigations (MI)

Refer to Table 4 design elements 1, 2, 3, and 11.

Effects Determination

Due to lack of historical sightings and distance from source populations, the probability of a grizzly bear occurring in the Sanpoil project area is very low. The area is separated from the recovery area by 3 major rivers and lies in grizzly bear management situation 5, therefore habitats in the project area are not needed for the survival and eventual recovery of the species. Timber harvest would create openings in the forest canopy that could enhance forage production for bears. On-going project activities could disturb and displace a bear from a foraging or resting site but will not have a significant impact to the population as a whole. The project would result in a temporary increase in drivable road miles and substantial decrease in core habitat. These effects would be moderate in duration (about 5 years). The post-project number and

distribution of miles of open roads on NFS land would remain essentially unchanged. Based on these considerations, the proposed action may affect, but are not likely to adversely affect grizzly bears.

North American wolverine, proposed for ESA listing

Existing Conditions

Due to their large home range size and habitat needs, this species is rare and uncommon throughout their range. Although they are rare in northeastern Washington, there have been both confirmed and unconfirmed reports of wolverine on or near the CNF. North American wolverines have not been documented in the project area. The most recent confirmed sighting on the CNF occurred in 2014 and was on the very eastern edge of the forest, which is greater than 130 miles away and across 3 major rivers.

Den Habitat - The project area does not contain suitable denning habitat for wolverines. Wolverine denning is strongly associated with persistent spring snow through the end of denning period in mid-May but the relationship between persistent snow and wolverine denning occurs when there is snow in more than half of the years that can be detected on a scale of 0.3 miles (Copeland et al. 2010). Snow depths as measured at the Sentinel Butte Snotel site (http://www.wcc.nrcs.usda.gov/nwcc/site?sitenum=1043) show there is not enough snow on the Crest in this area to support wolverine denning. Additionally, the project area does not contain avalanche paths, talus slopes, or boulder fields associated with den sites.

Foraging Habitat – Wolverines are opportunistic scavengers that consume a wide variety of plant and animal food, with carrion (especially big game animals) serving as the mainstay of the animal's winter diet. They can kill big game animals under certain conditions such as in deep snow. Hornocker and Hash (1981) have suggested that timber harvest could improve habitat for big game and small mammal populations, thereby providing more prey for wolverines. Big game habitats will be described in the section on gray wolves, later in this document. The project area provides habitat for ungulates and small mammals, prey of wolverines, as well as a diversity of vegetation that wolverine could eat. Many forested stands in the project area, particularly those on cooler, moister northerly aspects, support a shrub layer that includes berry-producing shrubs such as huckleberries.

Travel Corridors - Hornocker and Hash (1981) found little difference in the movements, habitat use, or behavior of wolverines that inhabited logged versus un-logged habitats in their Montana study site. These authors reported that wolverines occasionally crossed created openings, but tended to do so in straight lines and at a running gait; as opposed to more wandering and leisurely patterns in forested areas. In Idaho, wolverines commonly crossed natural openings and areas with little overhead tree canopy such as burned areas, meadows, and alpine areas (Copeland 1996).

Seclusion habitat - As with grizzly bears, human access on roads and trails may negatively affect wolverine. Sufficient cover exists in the project area to provide security for wolverines that are moving through the area. Approximately 45% of the Sanpoil project area consists of core area further than 500m from an open road.

Environmental Consequences

Direct and Indirect Effects –

Den Habitat – No denning habitat exists in the project area, therefore no effects to any potential den habitat will occur.

Foraging Habitat –Refer to grizzly bear effects on foraging as the effects described are the same.

Travel Corridors - No project activities would occur in any travel corridors we mapped for pine marten which can serve the needs of both pine marten and wolverine. Although these corridors could be used by wolverines dispersing along streams and ridgelines in the project area, they are likely not necessary for the effective dispersal of these animals.

Seclusion –Refer to grizzly bear seclusion effects as the effects described are the same.

Cumulative Effects

The area considered for cumulative effects analysis consists of the Kettle Range south of the Canadian border because wolverines have such large home ranges and occur at such low densities. There are cumulative effects which will occur to wolverine habitat due to the overlap of other FS vegetation restoration projects and commercial harvest occurring on private lands throughout the cumulative effects area during the same time frame that this project will be occurring. (Refer to Appendix B Table 11 and Table 12) These cumulative effects will be the same as effects as described with the Sanpoil project effects. The resulting effects will include an additional decrease in hiding cover for approximately 5 years, a decrease in seclusion habitat due to an increase in human disturbance, and a potential increase in forage habitat. In consideration of these cumulative effects we are still meeting forest plan standards and guidelines for wolverine habitat.

Design Elements (DE) and/or Mitigations (MI)

None

Effects Determination

Based on the short to long-term project effects, the proposed action may affect, but is not likely to adversely affect wolverines. Timber harvest would create openings in the forest canopy that could enhance forage production for wolverines. On-going project activities could disturb and displace a wolverine from a foraging or resting site but will not have a significant impact to the population as a whole. Travel corridors would remain intact. The project would result in a temporary increase in drivable road miles and substantial decrease in core habitat. These effects would be moderate in duration (about 5 years). The post-project number and distribution of miles of open roads on NFS land would remain essentially unchanged and seclusion habitat would not be substantially affected.

Summary of Environmental Effects to T&E Species

The proposed action would move the project area closer to its historic condition with regards to the tree species mix, stocking levels, stand structural stages, and fuel loading. The action would potentially reduce the extent and severity of wildfires. This action would increase forest edge habitat and the percentage of stands in early structural stages; improving conditions for big game species and many sensitive invertebrates. Snowshoe hare habitat could be recruited within created openings in 15-20 years, potentially benefitting lynx. Grizzly bears and other wildlife would be better able take advantage of existing shrub and herbaceous forage resources within the area. The following tables provide a brief summary of the effects determinations for T&E species and the rationale for each determination.

Table 10. Summary of effects determinations for T&E species

T&E species	Determination	Rationale for determination

Canada lynx	May affect, not likely to adversely affect	No known lynx den site on the CNF. Potential den stands protected by avoidance. Activities near potential stands would occur outside of the denning period. Timber harvest could promote growth of snowshoe hare habitat in the project area within 5-10 years. Project would be consistent with management recommendations in the Canada Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team 2013).
Grizzly bear	May affect, not likely to adversely affect	Project is outside of the grizzly bear recovery area. Increase in disturbance and small reduction of core habitat during the project. Post-project, drivable road densities would be reduced and core habitat would be increased. Hiding cover will be degraded in the short term, hiding cover will be maintained along open roads when possible. Timber harvest and under-burning would likely improve local green forage production / palatability, and berry production over the short to mid-term.
Wolverine	May affect, not likely to adversely affect	Structural stage distribution by moving it towards the more historic conditions, conditions in which wolverines evolved. For prey habitat, the Proposed Action would slightly improve conditions by improving forage.

Compliance with the Forest Plan and Other Relevant Laws, Regulations, Polices, and Plans

The proposed action would be consistent with Forest Plan (USDA 1988) standards and guidelines for TES and other wildlife, as amended by Lowe (1995), and USDI (2001). The project would be consistent with standards, guidelines, and recommendations in the grizzly bear recovery plan (USFWS 1993) and other guidance for grizzly bears (USDI et al. 1986, USDA 2011). The project would be consistent with management recommendations in the LCAS (Interagency Lynx Biology Team 2013). In addition, the project would adhere closely to management recommendations in existing conservation assessments and other guidance.

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Appendix A: Past, Present, or Reasonably Foreseeable Future Projects within the Sanpoil Project Area

Table 11: Past Actions that may contribute to Cumulative Effects

Past Actions	Timing	Description	Residual Effects
Road Access			
Resurfacing about six miles from 2350-000 to Obrien Creek	2017	Recondition and place aggregate along the 2053 road. Replace one 18" pipe and seed for turf reestablishment in disturbed areas.	Reduction in sediment input to Ninemile creek. In some cases previous fires have changed vegetation conditions by killing trees or burning up dead wood. In some cases, snags were created but their tenure on the landscape varies depending on fire intensity and weather. In most cases the fires are not continuing to have an effect that would influence the cumulative effects analysis. These fires have contributed to the existing condition and would be analyzed as part of the existing environment.
Wildfires			
White Mountain Fire	1988	5,588 acers burned in the project boundary for Sanpoil 16,395 acres in the Watershed Analysis Scale (in Hall Creek and Upper Sanpoil River watersheds)	Burned areas continue to grow shrubs and develop mature trees
Northstar Fire	2015	43,083 acres in the Watershed Analysis Scale in the Middle Sanpoil River and Upper Sanpoil River watersheds	Burned areas continue to grow shrubs and develop mature trees
Vegetation Management/Fuels Reduction Projects—Past Harvest			
Commercial Harvest	1950s-Present	Past treatments in the Sanpoil area consisted mostly of even-age harvest systems prior to the mid-1990s. After the mid-1990s harvest shifted more toward commercial thinning and other mutli-aged harvest systems. The most recent treatment helps determine the next steps for stand management. Previous treatments are taken into consideration for current projects as young stands are in need of thinning, mature dense stands may be in need of thinning, and stand with insect and disease problems may benefit from regeneration treatments.	Past treatments will help determine prescriptions for the Sanpoil project and may influence stand trajectory into the future.
CCT Harvest **in the three watersheds** that overlap the Sanpoil Project Area	1980s	Treatments of all types occurring between 1980 and 1989, rough estimate based on interpreted data **9,385 acres treatment**	Harvest has either been completed or is planned for the decade listed. Most treatments occur south of the Sanpoil project area and very few treatments fall into the Upper Sanpoil River Watershed.

Past Actions	Timing	Description	Residual Effects
	1990s	Treatments of all types occurring between 1990 and 1999, rough estimate based on interpreted data **21,680 acres treatment**	
	2000s	Treatments of all types occurring between 2000 and 2009, rough estimate based on interpreted data **16,733 acres treatment**	
	2010s	Treatments of all types occurring between 2010 and 2017, rough estimate based on interpreted data **991 acres treatment**	
Commercial Harvest on Private Land **in the three watersheds** that overlap the project area	July 2018 (estimated start of harvest) through December 2018	Active Forest Practices Applications in the three watersheds that overlap the project area (includes Upper Sanpoil, Middle Sanpoil, and Hall Creek Watersheds) Even-age harvest 132 acres, Uneven-aged harvest 885 acres, Salvage 152 acres.	Harvest has been authorized by the DNR and may occur at any time during the application period. Cutting would be generally limited to smaller private holdings and could be either even aged or uneven aged harvest as noted.
	2019	Even-aged harvest 803 acres Uneven-aged harvest 87 acres	
	2020	Even-aged harvest 623 acres Uneven-aged harvest 1,629 acres	
	2024	Even-aged harvest 64 acres Uneven-aged harvest 401 acres	
	2026	Even-aged harvest 401 acres	
	2027	Uneven-aged harvest 317 acres	
Commercial Harvest on Private Land **in the project area**	2018-2020	Even-aged harvest 427 acres	Harvest has been authorized by the DNR and may occur at any time during the application period. Cutting would be generally limited to smaller private holdings and could be either even aged or uneven aged harvest as noted.
Swan Lake 250 acre Overstory Removal	2016	Removal of fire-killed overstory trees in areas of high recreation use. Stands were previously popular for dispersed camping, hunting, and berry picking.	By removing unsafe overstory trees, and promoting a healthy green and growing understory, these areas would continue to see high levels of recreation use in the future. Stands would be converted to early seral stage, as newly established young trees begin to grow.

Past activities listed here created current forest structure and associated wildlife habitat. These past activities can be considered in most cases as best analyzed by describing the current condition.

Table 12: Ongoing or reasonably foreseeable future actions that may contribute to cumulative effects.

Project Name/Activity	Timing	Description	Predicted or Ongoing Effects
Vegetation Management/Fuels Reduction Projects			
Roadside Hazard Tree Projects	2016, 2017, 2018	Removal of hazard trees within roughly 150 feet of either side of all roads within the fire perimeter	Removal of dead or dying trees along the roadside would reduce the number of snags immediately adjacent to the roadways.
Removal of Hazard Trees from Developed Recreation Sites Along Highway 20	Ongoing	Removal of hazard trees which pose a threat to recreation users. Assessment will follow developed site danger tree guidance.	Slight reduction over time of snags in developed recreation sites. Effects should continue the current trend as danger tree management has been ongoing for years.
Windstorm Understory Treatments	2017, 2018	Understory treatments including whip falling and PCT are to be completed in 2017. Treatments are likely to be completed by 2019.	Treatments in the understory are aimed at allowing good growth of remaining trees.
Sherman Pass Project	2018-2020	Treatments would include commercial harvest and fuels reduction.	Removal of green and dead and dying trees across the project area. Follow up treatments would include prescribed burning and small pine thinning. Treatments could also result in changes to livestock management, habituation of livestock to the landscape, changes in natural barriers, and changes to the available forage base.
Treatment of Private Land north of McMann Creek	2017	The Northstar fire burned a portion of a large privately held parcel of timber land in 2015. The owner plans to begin salvage dead and dying trees.	Removal of snags along with temporary disturbance from logging equipment and temporary road construction needed to access timber.
Range			
Grazing	Present/ ongoing	active allotments overlap with the Sanpoil project area.	
Aquatic Resources			
Upgrade aquatic organism passage on the 2050-600 road Hall Creek at Ninemile	Installed sometime during Sanpoil Project (2017-2027)	Install new bottomless arch to allow aquatic organisms to pass and provide passage for 100 year floods.	Would allow aquatic organisms to move upstream of the old culvert and utilize the upper reach.
Invasive Plant Treatments			
Invasive Plant Treatment	Ongoing	Weed sites in and around the project area are slated for eradiation via herbicide spraying by Ferry County.	Treatments will result in a reduction in the extent of invasive plant sites and better prevention of establishment and spread.
Recreation & Transportation			
Sherman Pass BPA Powerline Management	Ongoing	Ongoing needs to maintain short segments of powerline access routes and reduce vegetation that may compete with powerline operations.	Effects would be outside the Sanpoil project area but would be inside the watershed analysis scale.

Project Name/Activity	Timing	Description	Predicted or Ongoing Effects
Maintenance of State Highway 20	Ongoing	Activities would include sanding, salting during the winter as well as hazard tree removal as needed along the route.	Effects would be outside the Sanpoil project area but would be inside the watershed analysis scale. Management has been ongoing for a very long time and effects are expected to continue to be well represented by the existing condition.
10 Mile Campground Restoration	2018-2020	Planned treatments would include maintaining the site west of the road and east of the road would see removal of infrastructure, removal of fill on the roads, removal of campsites and spur roads accessing sites. A small parking area would be left near the road, and access for fishing would be preserved. Plans also include removal of an outhouse. The area would be revegetated upon project completion.	Long term should result in reduced sediment to the stream, improved riparian vegetation and bank stability by limiting heavy visitor traffic close to the river.
Gibraltar Trail Connections	2019-2022	Some segments of trail approved under the project still need to be constructed mostly on existing travel ways to complete the full loop system. This includes a portion of the trail up to Quartz Mountain.	Potential sediment delivery to streams due to a few stream crossings in the area. Once the full loop trail is completed may see an increase in use.
Pacific Northwest Trail Construction	2027	In two to three years the PNTA committee should have a management plan written for this congressionally designated trail. At that time work would begin to plan, analyze and designate trail routes through this area. Focusing on moving trail alignment off roads where necessary. This work of planning the new route could take 5 years. Finally there may be additional NEPA needed to authorize construction of the trail itself which could take a few years longer. Total time before ground breaking new trail is estimated to be 10 years.	Effects may include potential increase in recreation users including dispersed camping along the route even before trail routes are finalized and construction begins on the last segments.
Firewood Cutting	Present/ ongoing	Cutting and removal of dead trees within 150 feet of open roads is allowed. This activity occurs in a few key areas such as McMann Creek throughout the project area.	Firewood cutting may result in a reduction in snags near roadways and may generate increased residual fuel loadings where small branches and limbs are left onsite.
Dispersed Recreation	Present/ ongoing	There are 33 mapped dispersed recreation sites along FS roads where infrequent overnight use occurs. (See figure xx)	Recreation may result in localized damage to vegetation and may contribute to the spread of invasive plants.

Appendix B: Maps
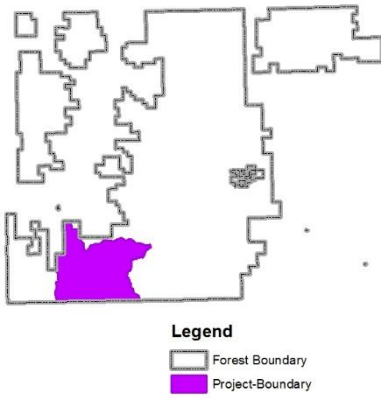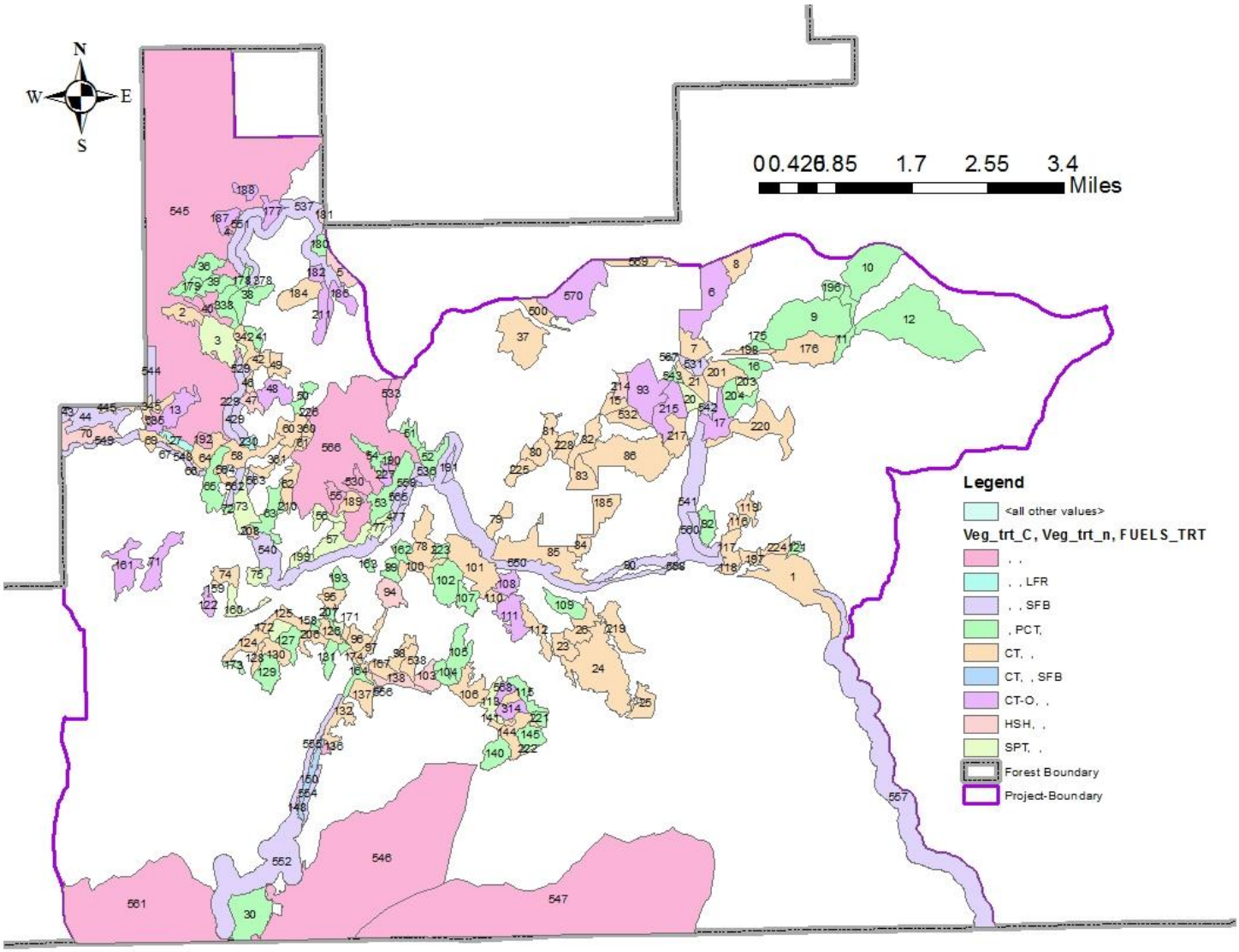
Figure 3: Project Area and Treatment Map